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1999
NORTON SOUND – PORT CLARENCE – KOTZEBUE

By

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PRESENTATION

This report summarizes the 1999 season and historical information concerning management of the commercial and subsistence fisheries of the Norton Sound, Port Clarence and Kotzebue Sound Districts. Data from special management and research projects are included in this report. A more complete documentation of project results will be presented in separate reports.

Data presented in this report supersedes information found in previous management reports. An attempt has been made to correct errors presented in earlier reports. Previously unreported data has been included and is indicated by appropriate footnotes. Current year catch data presented has been derived from seasonal field data.

This report is organized into the following major sections:

- (1) Salmon
- (2) Herring
- (3) King Crab
- (4) Miscellaneous species

In order to facilitate use of this report, tabular data has been separated into two categories: 1) tables presenting annual data; 2) appendix tables which present historic comparisons.

SECTION 1: SALMON
(Includes Norton Sound, Port Clarence
and Kotzebue Districts)

SECTION 1 - SALMON

INTRODUCTION

Boundaries

The Norton Sound, Port Clarence and Kotzebue Sound salmon management Districts include all waters from Point Romanof in southern Norton Sound to Point Hope and includes St. Lawrence Island. These management districts comprise over 65,000 square miles, with a coastline exceeding that of California, Oregon, and Washington combined.

Salmon Resources

Five species of Pacific salmon are indigenous to the area with chum (*Oncorhynchus keta*) and pink salmon (*O. gorbuscha*) historically being the most abundant. Chum, pink, and chinook (king) salmon (*O. tshawytscha*) have been found as far north as Barrow; however, these species are uncommon north of the Kotzebue Sound drainages. The northernmost large concentrations of chum salmon are found within the Kotzebue Sound drainages, while large numbers of pink, chinook and coho (*O. kisutch*) salmon are not found north of Norton Sound. Small sockeye (red) salmon (*O. nerka*) populations exist within a few Southern Seward Peninsula drainages.

Commercial Fishery

In 1959 and 1960, Department biologists conducted resource inventories that indicated harvestable surpluses of salmon available in several river systems of the Norton Sound-Arctic area. The Department liberalized various regulations and encouraged processors to explore and develop new fishing grounds. As a result, commercial salmon fishing activity has grown significantly since statehood, enabling some local residents to obtain cash income.

The majority of commercial fishermen and many buying station workers are resident Native Alaskans (Yupik, Inupiat, Siberian Yupik from St. Lawrence Island). Commercial fishermen operate set gillnets from outboard powered skiffs to capture salmon. All commercial salmon fishing is done in coastal marine waters.

Salmon effort and catch per unit effort data (CPUE) presented throughout this section have been derived as follows. Boat (or fisherman) hours have been computed after assuming that if a fishing boat delivers during a fishing period, it fished the entire period. The total number of individual boats delivering in any period is multiplied by the number of hours open to commercial fishing. Catch per fisherman (or boat) hour is obtained by dividing the

total fishermen hours into the catch for the corresponding period of time. Total fishermen (or boats) is the total number of fishermen making deliveries, regardless of how many deliveries were made or days fished during a particular period or season. There are a number of fishermen who deliver only once or twice during the entire season. Total days fished is the total number of hours open to commercial fishing during the season divided by 24 hours.

Subsistence Fishery

There are approximately 16,000 people in the area, the majority of whom are Native Alaskans, residing in more than 26 small villages scattered along the coast and the major river systems. Nearly all of the local residents are dependent to varying degrees on the fish and game resources for their livelihood.

Subsistence fishermen operate gillnets or seines in the main rivers and, to a lesser extent, in the coastal marine waters capturing primarily salmon, whitefish, arctic char and inconnu (sheefish). Beach seines are used near the spawning grounds to catch schooling or spawning salmon and other species of fish. The major portion of fish taken during the summer months is air dried or smoked for later consumption by villagers or occasionally their dogs.

Prior to 1960, subsistence harvest information is incomplete or entirely lacking. From the early 1960s until 1982, the Department conducted annual household surveys in communities with major salmon fisheries. Beginning in 1983, budgetary restrictions made it impossible to conduct surveys in each village. For the last 5 years that these surveys were conducted for Norton Sound (1978-1982) the average subsistence catch was 73,000 salmon including all species (Appendix Table A8). The majority of salmon taken are pinks and chums.

Subsistence surveys for the Kotzebue area were less complete. An expansion of documented surveys from several years for different villages estimates total subsistence salmon harvest for the Kotzebue Sound area to approach 75,000 annually (Appendix Table C6).

Since 1974, subsistence salmon catches in the Nome Subdistrict (Subdistrict 1) have been determined from the return of catch calendars as required under a permit system. Not all fishermen were contacted, and the data were not expanded therefore these harvests should be considered minimum figures.

In 1994, the Department initiated a new annual subsistence salmon harvest assessment effort in northwest Alaska that provided more extensive, complete, and reliable salmon harvest estimates than existed previously. In 1999, the department continued its subsistence salmon harvest assessment program. Household surveys were conducted in 8 communities in the Norton Sound District, both communities in the Port Clarence District, and six of the

15 Kotzebue District communities. In Kotzebue, subsistence salmon harvests were determined through a postcard survey and in the Nome area, harvests were determined through fishing permits and catch calendars. In the 16 surveyed communities, surveyors attempted to contact 100 percent of the households, with an actual contact rate of 75 percent in 1999. The harvest data were expanded to account for those households not contacted.

The goals of the post-season household survey were to:

- 1) collect harvest data that would result in a total harvest estimate for subsistence salmon by species and community,
- 2) compile information on gear types, participation rates, sharing, use of salmon for dog food, and household size, and
- 3) update household lists and identify subsistence fishing households. Researchers interviewed households with the use of a two-page survey instrument (Appendices G5-G7).

Management

The Division of Commercial Fisheries of the Alaska Department of Fish and Game is responsible for the management of commercial and subsistence fisheries in this vast area. The permanent full-time staff assigned to this area during 1999 consisted of the Area Management Biologist stationed in Nome, the Assistant Area Biologist and an Area Fish Culturist stationed in Nome, an Assistant Management Biologist in Kotzebue, and an Administrative Clerk assigned to the Nome office. In addition, seasonal assistance in conducting various management and research activities was provided by approximately 20 seasonal biologists and technicians in Norton Sound and Kotzebue Sound. Additional assistance was provided by biologists from the regional staff. In 1999, interns funded by Norton Sound Economic Development Corporation (NSEDG) were utilized as fisheries technicians in some projects. Four cooperative projects staffed by Kawerak Inc. in Norton Sound supplement the salmon escapement monitoring activities of the area staff.

The main objective of the Department's program is to manage the commercial and subsistence salmon fisheries on a sustained yield basis. Various field projects are conducted to provide information on salmon abundance, migration and stock composition. Summaries of ADF&G and Kawerak Inc. projects are presented in Appendix G2.

Management of the salmon fishery is complicated by the difficulty in obtaining accurate escapement data in this large area and by insufficient comparative catch and return information. Management problems are compounded by the need to provide not only for adequate escapements, but for the needs of several different user groups. Alaska State law requires that subsistence uses receive a priority over other uses of fish and wildlife resources. If the subsistence harvest or demands increase, commercial fishing may be restricted. It should be pointed out that increases in commercial fishing efficiency are expected and may balance any immediate decline in subsistence utilization or increase in

run size with the result that present regulations have been maintained or made even more restrictive.

The basic regulation that governs the commercial salmon harvest in all districts is the scheduled weekly fishing period. Commercial fishing regulations provide for a total of two to four days of fishing per week during the open season depending on area and season. The Department attempts to distribute fishing effort throughout the entire return to avoid harvesting only particular segments of the return. Occasionally, fishing time is increased or decreased by Emergency Order, depending upon fishing conditions and the strength of the returns or spawning escapements, as determined by special studies conducted by the Department. Emergency Orders issued during the 1999 seasons are presented in Appendix G3.

Weekly fishery reports, which give information on fishery status and fishing schedules, are broadcast during the fishing season over radio KICY and KNOM in Nome, and KOTZ in Kotzebue. In addition, fishery news articles are published in the Nome Nugget, and the Arctic Sounder.

NORTON SOUND DISTRICT

District Boundaries

The Norton Sound Salmon District consists of all waters between Cape Douglas in the north and Point Romanof in the south. The district is divided into six subdistricts: Subdistrict 1, Nome; Subdistrict 2, Golovin; Subdistrict 3, Moses Point; Subdistrict 4, Norton Bay; Subdistrict 5, Shaktoolik; and Subdistrict 6, Unalakleet (Figure 1). Each of these subdistricts contains at least one major salmon-producing stream. Subdistrict boundaries were established to facilitate management of individual salmon stocks.

All commercial salmon fishing in the district is by set gillnets in marine waters; fishing effort is usually concentrated near river mouths. Commercial fishing typically begins in June and targets chinook salmon. Emphasis switches to chum salmon around June 25 and the coho salmon fishery begins the third week of July. The season closes September 7. Pink salmon may be very abundant on even year returns and a pink directed fishery may replace or may be scheduled to alternate periods with the historical chum directed fishery.

Salmon management has changed significantly during recent years due to limited market conditions and marginal returns of many salmon stocks within the northern portion of the district. The Eastern Subdistricts, Norton Bay, Shaktoolik, and Unalakleet all have fairly healthy salmon stocks. Commercial fishing in these subdistricts is managed using commercial fishing statistics and the Unalakleet River test fishing escapement index. Both the Golovin and Moses Point Subdistricts have recently suffered from poor chum salmon returns. In these two subdistricts, management first insures an adequate escapement, then a

subsistence harvest within historical levels and finally an attempt is made to provide for a commercial and sport harvest. The Nome Subdistrict is managed intensively for subsistence use. Tier II subsistence permits, registration permits, closed waters, setting fishing period length, limiting gear and harvest limits are all tools that can be employed throughout the season to provide for escapement needs and to maximize subsistence opportunity.

Historical Fishery Use

Fishing has been a part of life for Norton Sound residents for many centuries as indicated by archeological evidence dating back 2,000 years (Bockstoce, 1979). The largest pre-contact settlements on the Bering Strait Islands and the Western Seward Peninsula were located where marine mammals were the primary subsistence resource. The rest of the region's population lived in small groups scattered along the coast, often moving on a seasonal basis to access fish and wildlife resources (Thomas 1982). During summer months residents would disperse, usually in groups comprised of one or two families, and set up camps near the mouths of streams. Harvest levels of fish on any one stream were relatively small because of the low concentrations of people who caught only what their families and one or two dogs needed through the winter (Thomas 1982).

A large scale fur trade was developed by the Russians in the late 1800's and continued after the American purchase (Magdanz 1981). The activities and support for hundreds of commercial whalers and trading ships caused trading to increase in the region around 1848 (Ray 1975). The increased competition for walrus, caribou, and other species from outsiders may have increased the importance of salmon to area residents (Magdanz 1981). In the late 1890's gold was discovered on the Seward Peninsula and boom-towns sprang up with thousands of new immigrants flocking to the region. Commerce developed which drew people to central locations that evolved into year-round communities. Other reasons for communities to become established stemmed from the operation of missions.

The impact of mining was significant on fish populations. Nearly every stream on the Seward Peninsula had some sort of mining operation working on it which ranged from simple gold panning to sluice boxes to hydraulic giants to bucket line dredges. One example of extensive impact was on the Solomon River, which is only 30 miles long but had 13 dredges working at one time. Another obvious impact was simply the large number of people who came to live in the region between 1900 and 1930. Communities like Nome, with a population of 30,000 and Council with 10,000 people at one time, did not exist before gold was discovered.

It was in the late 19th century when the size of the dog teams increased from two or three to as many as ten to twenty. At about the same time, wooden boats began to replace kayaks (Thomas 1982). Consequently, the demand for dry fish to feed the dog teams increased along with the development of better means to harvest fish. Winter transportation throughout the region was done with hired dog teams and drivers who carried mail or

freight along the coast and across the state to the ice-free port at Seward. Dry fish became a major barter item in response to the great demand for dog food, which consisted of primarily chum and pink salmon (Thomas 1982).

Local residents would spend most of their summers catching and drying large amounts of salmon, some of which they kept for themselves and the rest would be bartered or sold to mining camps, roadhouses, and trading posts or stores. For example, the Haycock mining camp on the Koyuk River would buy about two tons of dry fish each year. There were roadhouses at Golovin, Walla Walla, Moses Point, Isaac's Point, Ungalik, Robertvale, foothills (south of Shaktoolik), Egavik, and many other locations. Dry fish was bought in units of bundles (50 dry fish tied together) at a typical price of 10 cents per pound from the fishermen. One elder in the area felt that more fish were retained for their own use as compared to the amount sold which may have averaged five to ten bundles per household (Thomas 1982).

After the gold rush the number of people gradually decreased over the next twenty years as the gold deposits were worked out. The number of dog teams diminished by the mid 1930's with the introduction of the mail plane and mechanical tractors. The last mail team contract ended in 1962 at Savoonga. Local stores continued to trade in dry fish at Shaktoolik, Saint Michael, Unalakleet, and Golovin. An example of quantity was the Shaktoolik store that had a cache 8x20x40 feet which would be filled to the top with dry fish. One elder said the stores would buy the fish for 6 cents a pound and sell them for 10 cents a pound or their equivalent in groceries and supplies (Thomas 1982). By the early 1960's, commercial salmon fishing developed into a source of summer cash and snowmachines were replacing the need for dog teams (Thomas 1982). The use of dry fish to feed dogs decreased and cash became more available for trading at stores.

Commercial Fishery Overview

Commercial salmon fishing in this district first began in the Unalakleet and Shaktoolik Subdistricts in 1961. Most of the early interest involved chinook and coho salmon that were flown in dressed condition to Anchorage for further processing. A single U.S. freezer ship also purchased and processed chum and pink salmon during 1961. In 1962, two floating cannery ships operated in the district and the commercial fishery was extended into the Norton Bay, Moses Point and Golovin Bay Subdistricts. The peak in salmon canning operations occurred during 1963.

Since then, markets have been sporadic and some subdistricts have often been unable to attract buyers for entire seasons. A joint venture between KEG (Koyuk-Elim-Golovin) Fisheries and NPL Alaska, Inc., operated from 1984 until mid-season in 1988. A permit issued by the Governor allowed two Japanese freezer ships to buy directly from domestic fishermen and was limited to salmon caught in the internal waters of Golovin and Norton Bays. Currently, the most consistent markets are at Unalakleet and Shaktoolik where some onshore processing occurs.

The commercial salmon fishing season opens by emergency order between June 8 and July 1, depending on run timing within each subdistrict. The season closes by regulation on August 31 in Subdistricts 1, 2, and 3, and on September 7 in Subdistricts 4, 5, and 6, but processors often terminate their operations prior to the regulatory closure dates. Two 48-hour fishing periods normally occur each week unless changed by emergency order with the exception of the Nome and Moses Point Subdistricts, where two 24-hour fishing periods are scheduled each week.

Commercial fishing gear is restricted to set gillnets, with a maximum aggregate length of 100 fathoms allowed for each fisherman. There are no mesh size or depth restrictions during the normally scheduled periods. However, mesh size is often restricted in an attempt to harvest a specific species of salmon. The majority of the gillnets fished are approximately 5 3/4 inch stretched measure. In the Unalakleet and Shaktoolik Subdistricts, 8 1/4 inch stretched mesh gillnets are commonly used during the chinook salmon run in June through early July. During years when large pink salmon runs occur, the Department provides fishing periods when only 4 1/2 inch mesh nets or less may be set or drifted. These special small mesh periods are an attempt to target pink salmon without over harvesting the larger sized salmon species.

Most fishermen do not tend their nets continuously once they are set, leaving them unattended overnight. Fish quality suffers due to the length of time fish may be left in the nets and is especially poor when storms prevent fishermen from checking their gear for extended periods of time.

Commercial Fishery Management

The Norton Sound District is managed on the basis of comparative commercial catch data, escapements and weather conditions. A single factor or combination of factors may result in issuance of emergency orders affecting seasons, fishing periods, allowable mesh size, and areas.

Aerial surveys are used to monitor escapements in the majority of the Norton Sound streams. Weather conditions, time of day, type of aircraft, water conditions, bottom conditions, date of survey, and efficiency of the surveyor and pilot must be taken into account when making inter-annual aerial survey comparisons. Counting towers are a much more consistent and accurate method of obtaining escapement information and have been utilized on many river systems in Norton Sound. Seven counting towers were operated in 1999.

The commercial fishing season begins with chinook salmon in mid June. Emphasis switches to chum salmon around June 25, then gradually shifts to coho during the third week in July. Pink salmon are abundant during even years, but there is often no market for this species. The southern Subdistricts 5 and 6 (Shaktoolik and Unalakleet) have

maintained commercial fisheries. They target chinook, chum, and coho salmon, with chinook and coho salmon catches remaining fairly stable while chum salmon catches have been declining since the early 1980's. Management has consisted of a series of Emergency Orders that open and close fishing seasons and periods, adjust fishing time, and restrict mesh size.

Commercial fisheries in Subdistricts 2 and 3 (Golovin and Moses Point) target chum salmon and pink salmon during even numbered years. The commercial chum salmon harvest has dropped dramatically since the mid 1980's. Poor returns have resulted in restrictive management actions during recent years when the seasons have been closed by E.O. to allow for escapement and subsistence needs.

There has been little or no commercial salmon harvests in Subdistricts 1 and 4 (Nome and Koyuk) since the early 1980's. In the Nome Subdistrict this is due to very depressed chum salmon stocks which in recent years require closure or severe restrictions on the fishery. Conversely, the Norton Bay Subdistrict has healthy stocks, but have been unable to attract markets willing to operate in this remote area.

Subsistence Fishery Overview

Due to budgetary restrictions, household subsistence harvest surveys were not conducted district wide in Norton Sound from 1985 to 1993. Since 1994, the department has conducted an annual subsistence salmon harvest assessment effort in northwest Alaska which provided more extensive, complete, and reliable salmon harvest estimates than previously existed. These household subsistence harvest surveys are primarily funded by the Commercial Fisheries Management and Development Division and were conducted by the Division of Subsistence during the fall in 10 Norton Sound villages. For the second time, the St. Lawrence Island communities of Gambell and Savoonga were included in the Norton Sound District surveys. Subsistence harvest estimates for the district are generated from the data gathered by the survey project.

Daily surveys of Unalakleet River and ocean subsistence fishermen have been conducted annually since 1985 during the chinook salmon run. Although total harvests by subsistence fishers were not documented, effort and catch information was used to judge timing and magnitude of the chinook salmon return. The commercial fishery is delayed until it becomes apparent subsistence needs are being met and chinook salmon are beginning their upstream migration as indicated by the Department of Fish and Game test net in the lower Unalakleet River. There is a growing trend to move subsistence nets from the river mouth out to the ocean in order to avoid large debris loads from spring runoff. It is presently unclear what changes this fishing technique will have on chinook salmon escapement.

Low salmon stock levels in the Nome Subdistrict combined with a large concentration of users has required issuing subsistence harvest permits for the area since 1974. These are issued by regulation to each household and designated fishing location. Each location may

have its own catch limit per permit and the fisherman is allowed to change locations after notifying the local Fish and Game office. After the fishing season, households must return the completed permit to the department, whether or not they actually fished.

Regulatory Actions in Nome Subdistrict

Although pink salmon are usually the most abundant species of salmon in Subdistrict 1 streams, the commercial fishery has primarily targeted chum salmon during the 1970's. The relatively large chum salmon catches in this subdistrict in conjunction with weak local abundance implied that the fishery intercepts non-local stocks. A 1978-79 Norton Sound stock separation study confirmed this view. Salmon tagged near Nome were re-captured in fisheries from Golovin (Subdistrict 2) to Kotzebue. In an attempt to provide for spawning requirements in addition to an important subsistence fishery that targets local stocks, a commercial harvest guideline of 5,000-15,000 chum salmon was adopted as a regulation.

Due to poor chum salmon escapement during the 1982 and 1983 seasons, the Board of Fisheries, in response to an advisory committee petition, directed the Department to manage the commercial fishery so that chum salmon escapement could be optimized. During the 1984 fall Board of Fisheries meetings, these directives that had been in practice that season became regulation. In response to public and advisory board proposals, the following commercial fishery restrictions were adopted as regulations:

- 1) Salmon may be taken commercially only from July 1 through August 31.
- 2) Fishing periods were restricted to two 24-hour periods per week.
- 3) Waters west of Cape Nome were closed to commercial salmon fishing to allow for rebuilding of the river stock that supported the historic subsistence effort.

The Department was also directed to allow a harvest at the lower end of the guideline harvest range of 5,000 to 15,000 chum salmon, as stipulated in 5AAC 04.360.

In addition to these commercial fishing restrictions, a proposal to restrict the sport fishery in the Nome and Snake Rivers was adopted in 1984:

With a bag and possession limit of 15 salmon, other than chinook salmon, only 5 could be chum and coho salmon, in combination.

Subsistence permit limits in the Nome and Snake Rivers were restricted to 20 chum and 20 coho salmon. The remainder of the permit limit could be filled with salmon other than chum or coho salmon.

However, even with these restrictive regulations in place, chum salmon escapement goals were difficult to attain. The 1987 fishing season experienced poor returns of both chum and pink salmon to Nome Subdistrict streams. Numerous management actions were made which curtailed commercial fishing activities, and later, sport, personal use, and subsistence were also restricted. Even with such drastic fishery restrictions, escapement goals for chum salmon were not attained during 1987 in the Nome, Eldorado, Flambeau, Bonanza, Snake, and Solomon Rivers. In response to this continuing trend of decreasing chum and pink salmon returns to the Nome Subdistrict, several new regulations were adopted during the 1987 Alaska Board of Fisheries meetings.

At that time with the commercial fishery all but eliminated, proposals affecting the sport, personal use, and subsistence fisheries were considered. The following sport fish regulations were adopted for all Nome area road system streams (Seward Peninsula drainages from Cape Prince of Wales to Cape Darby):

- 1) For salmon other than chinook, 10 per day, 10 in possession, only 3 which may be chum salmon and coho salmon, in combination.
- 2) For chinook salmon, 1 per day, 1 in possession.

These new regulations superseded those adopted during 1984. Additional new regulations affecting personal use and subsistence fishermen which were adopted in 1987 included:

- 1) In the Nome River, no person may operate more than 50 feet of gillnet in the aggregate.
- 2) The Nome River was added to the regulation 5AAC 01.170 (e) which states that small mesh gillnets (less than 4 ½ inch mesh) and beach seines may not be used in specific Nome Subdistrict streams.

Regulation changes in 1992 restricted the use of beach seines in the Nome Subdistrict. The managers were given the authority to allow the subsistence harvest of chum or pink salmon by beach seine if escapement needs were likely to be met. Beginning in 1991, no chum salmon harvests were allowed until escapement goals were likely to be met or conservative management actions were judged to be no longer effective. In the past, beach seines were viewed as an overly effective means to harvest fish, but during the last two years, beach seines were used as a means to harvest abundant species, while allowing the live release of other species experiencing depressed runs.

The Nome Subdistrict was designated as a Tier II salmon management area during a special meeting by the Alaska Board of Fisheries held in Nome during March of 1999. Through a series of Board of Fisheries directed meetings, the Board concluded that the previous management plan did not provide adequate opportunity for all subsistence salmon users to supply their annual needs for chum salmon. As a result, the board allocated a subsistence priority to twenty individuals who applied and qualified for Tier II permits based on fishing

history, dependence, and the projected harvestable surplus. The intent was to allow 20 permit holder's first priority over other subsistence users should only a small harvestable surplus of chum salmon return. If the run was assessed to be strong, then the subsistence fishery would open to all Alaskan residents of who obtain a registration permit and restrict individual harvests to prescribed bag limits. In addition, the Board established "Closed Waters" areas that would protect chum salmon on the spawning grounds where no subsistence salmon fishing would be allowed at any time.

1999 Norton Sound Salmon Fishery

Commercial Fishery Overview

The 1999 Norton Sound commercial salmon season can be described as the poorest season on record. The fishing season began two weeks later than usual on July 2 due to a late spring breakup and ended 3 days before the regulatory closure on September 4 as a result of poor returns. Commercial fishing time and areas were set throughout the season by Emergency Order. Both the combined commercial harvest of all salmon species and fishing effort were the lowest on record. As a result, the 1999 fishery value to the fishers of \$76,860 was the lowest value since 1968.

Table 1 lists the Norton Sound salmon historical and current year commercial harvests relative to the recent 5-year (1994-1998) and the recent 10-year (1989-1998) averages. The total salmon harvest was very poor for all salmon species. The 1999 chinook salmon harvest of 2,508 was the lowest since 1976 at 68% below the recent 5-year average and 66% below the recent 10-year average. The coho salmon harvest of 12,662 was the lowest since 1978 at 77% below the recent 5-year average and 79% below the recent 10-year average catches. Commercial markets for pink salmon are sporadic in Norton Sound, but have recently generated interest for the strong even year returns. The 1999 pink salmon return was weak as expected allowing no commercial harvest. The chum salmon commercial harvest of 7,881 was also the lowest on record at 68% below the 5-year average and 83% below the 10-year average. These low harvests for all species totaling only 23,051 fish can be attributed almost exclusively to the low salmon runs throughout Norton Sound. A commercial market was available, but harvestable surpluses of salmon were very low which dictated restrictive fisheries management.

Only one primary salmon buyer operated in Norton Sound during the 1999 season. The newly built Unalakleet fish plant operated by Norton Sound Seafood Products was the base of commercial fisheries operations. Salmon were both delivered to the Unalakleet dock and tendered from the neighboring Shaktoolik Subdistrict. At Unalakleet, salmon were headed and gutted, iced, and then most were transported fresh to markets in Anchorage via airfreight. Some salmon were held in freezers for later sales.

The average price paid for chinook salmon was \$.82 per pound, \$.35/lb for coho, and \$.11/lb for chum salmon (Table 3). The total value of the raw fish reported on fish tickets in 1999 was \$76,860. This was 83% below the recent 5-year average and 82% below the recent 10-year average (Appendix Table 1). The recent decline in traditional salmon markets has been offset to some extent in Norton Sound with the development of a pink salmon market on even year returns. However, no harvest of pink salmon combined with exceptionally low harvests of other species was the cause of this unusually low fishery value for 1999.

Subsistence Fishery Summary

The department documented the 1999 subsistence salmon harvests in Norton Sound using two methods: 1) post-season household surveys were conducted in Golovin, White Mountain, Elim, Koyuk, Shaktoolik, Unalakleet, St. Michael, Stebbins, Savoonga and Gambell, and 2) subsistence fishing permits in the Nome Subdistrict and the Salmon Lake-Pilgrim River drainage. Council, a seasonal community on the Niukluk River, had no year-round residents in 1999 and was not surveyed. However, an unknown amount of subsistence salmon fishing occurs at Council by Nome residents that is not documented by household surveys or permits. An unknown amount of subsistence salmon fishing by Nome residents also occurs at Woolley Lagoon. In 1999 for the first time, Tier II chum salmon subsistence fishing permits were also issued to a limited number of Nome households with the intent that these households would have first priority over other subsistence users if only a small number of chum salmon were available for harvest. Tier I fishing permits were available to all other households when run strength was determined to be adequate. In 1999, 89 Tier I and 20 Tier II permits were issued for Nome Subdistrict (Table 2, Table 3). Eighty-three percent of these permits were returned to the department. Thirty-five households requested permits for the Salmon Lake or Pilgrim River drainage (Port Clarence District). Sixty-three percent of these permits were returned.

The subsistence harvest in the Norton Sound District in 1999 was 61,078 fish (Table 7). This was the lowest subsistence harvest documented in the six years of this survey project. Of the total salmon harvest, 10% were chinook, 32% were chum, 33% were pink salmon, 2% were sockeye, and 23% percent were coho. This harvest was 37% less than the 1998 harvest for comparable communities and about 18% less than the next lowest harvest that occurred in 1997. A combination of weak coho and chum salmon runs, and an off-year for pink salmon abundance contributed to the low harvest in 1999. Nome area permit information and Norton Sound subsistence harvests by community can be found in Table 2 and Table 7.

The estimated mean salmon harvest was 68 salmon per household in the Norton Sound District. This includes 7 chinook, 22 chum, 22 pink, 1 sockeye, and 16 coho. Subdistrict 5 (Shaktoolik) accounted for the largest mean household harvest of salmon, an estimated 142 fish. The mean household harvests in the other subdistricts were 7 salmon in Subdistrict 1 (Nome), 46 salmon in Subdistrict 2 (Golovin and White Mountain), 48 salmon in

Subdistrict 3 (Elim), 92 salmon in Subdistrict 4 (Koyuk), 110 salmon in Subdistrict 6 (Unalakleet), and 49 salmon in southern Norton Sound (St. Michael and Stebbins).

In the Norton Sound District, 55 percent of the households subsistence fished for salmon and an additional 9% assisted other households in processing subsistence-caught salmon. Three percent of the subsistence salmon harvest was used for dog food. Rod and reel was used by about 70% of households to harvest salmon, while 43% of households used gill nets, 13% used beach seines, and less than 1% used drift nets. Although rod and reel was the most widely used gear type, it accounted for only 11% of the total salmon harvest. Coho salmon was the primary target of rod and reel fishing.

In the Norton Sound District, 49% of the fishing households responded that their subsistence chum salmon fishing was "poor", 39% responded "average", and 12% responded "very good" (Georgette and Utermohle, 2000).

Season Summary by Subdistrict

Nome - Subdistrict 1

The commercial salmon season in the Nome Subdistrict is scheduled to take place by regulation between July 1 and August 31. However, a commercial salmon harvest could not be allowed due to inadequate harvestable surpluses of chum, pink, and coho salmon (Table 1). Commercial fishing in the subdistrict is typically very limited because the local salmon stocks are not abundant and the subsistence demand is high. Sport fishing for chum salmon is closed by regulation in the subdistrict. The recent ten year average commercial harvest is 1 sockeye, 197 coho, 32 pink, and 170 chum salmon (Appendix Table A2). The ten year average subsistence salmon harvest in the subdistrict is 48 chinook, 152 sockeye, 1,160 coho, 2,950 pink, and 3,212 chum salmon.

Subsistence fishing was closed by Emergency Order prior to the beginning of the chum salmon return to all Tier I fishermen with Tier II fishing only allowed in marine waters East of Cape Nome. The Board of Fish intended to allow more fishing time to Tier II permit holders early in the season when weather conditions are typically more suitable for processing salmon using traditional methods. The Board's intent was to limit the number of fishermen, thereby reducing the risk of overharvest early in the run before it could be fully assessed. The chum salmon run was first thought to be late, but later determined to be well below average in abundance. On July 20, the subdistrict was closed by Emergency Order to all subsistence fishing through August 2 to protect the chum salmon stocks of the Nome Subdistrict.

The subdistrict reopened to all Tier I and Tier II fishermen on August 3 to target coho salmon. The coho salmon return was also initially believed to be late, but later assessed well below average. On August 16, the Nome Subdistrict was again closed to all subsistence fishing through September 7 by Emergency Order. The subdistrict reopened only when it was felt that continued restrictions would do little to place more coho salmon

on the spawning grounds late in the season while lifting the restrictions would allow harvest opportunity of other species such as Dolly Varden and whitefish.

Golovin - Subdistrict 2

Over the past ten years, chum salmon stocks in the Golovnin Bay Subdistrict have received little or no commercial exploitation, yet in four of the past ten years spawning escapement goals have not been met. The 1999 Salmon Management Plan stated that the Golovnin Bay Subdistrict commercial harvest would be limited to a maximum of 15,000 chum salmon before mid-July in an attempt to protect chum salmon stocks and allow for some harvest while flesh quality is at its best. By that date, the chum salmon run would be assessed and fishing time could be adjusted accordingly.

No commercial chum or coho salmon periods were opened during the 1999 season due to the weak runs. In addition, the coho salmon sport fish bag limit was reduced from three fish per day down to one and eventually the season was closed. The entire Golovin Subdistrict was later closed to all subsistence fishing by Emergency Order from August 27 through September 16 in order to protect the remaining coho salmon return. This was the second time on record that the Golovin Subdistrict was closed to subsistence fishing.

The recent 5-year average harvest in the Golovin Subdistrict is 4 chinook, 1,157 coho, 22,215 pink, and 2,165 chum salmon (Appendix Table A3). The recent 10 year average harvest is 13 chinook, 4 sockeye, 787 coho, 11,596 pink, and 4,546 chum salmon. There was no commercial harvest allowed in 1999. The only other years when no commercial harvests occurred on record in this subdistrict were in 1965 and 1989.

Moses Point - Subdistrict 3

The Moses Point Subdistrict has also been experiencing below average chum salmon returns despite conservative management actions taken over the last ten years. However, the situation had improved slightly as indicated by the Kwiniuk River tower counts that have been at or above the escapement goal in the last five years. As a result, the river has been removed as a "River of Concern" by the Department. The 1999 Salmon Management Plan directed that there would not be a chum salmon directed fishery in order to protect the recovering stock. Fishing periods could be scheduled for other salmon species utilizing special restrictions to minimize the incidental chum salmon harvest. It was expected that fishing directed at other salmon species would not significantly affect the subdistrict's chum salmon escapement.

As the season progressed, it became apparent that all salmon species returning to the subdistrict were well below average and therefore, no commercial fishing was allowed in the Moses Point Subdistrict for 1999. For comparison, the recent 5-year average harvests are 191 chinook, 9 sockeye, 2,775 coho, 43,448 pink, and 1,316 chum salmon (Appendix Table A4). The recent 10-year averages are 138 chinook, 4 sockeye, 2,147 coho, 21,774

pink, and 1,145 chum salmon. The only other years when no commercial harvests occurred on record in this subdistrict were in 1965 and 1967.

Norton Bay - Subdistrict 4

The Norton Bay Subdistrict typically has difficulty attracting a buyer due to its remoteness and its reputation for watermarked fish. Consequently, regulatory changes were implemented that moved the western boundary from Six Mile Point to Isaac's Point in 1995 and the eastern boundary out to Point Dexter in 1998 in an attempt to improve fish quality. Due to lack of timely salmon escapement information, the Norton Bay Subdistrict is typically managed in concert with Shaktoolik and Unalakleet Subdistricts because they reflect similar trends in salmon return strength and timing. In 1999, no commercial salmon fishing was allowed due to marginal salmon returns. There has actually only been three seasons in the last eleven years when salmon have been commercially harvested in the subdistrict (Appendix Table A5).

Shaktoolik and Unalakleet - Subdistricts 5 and 6

Both the Shaktoolik and Unalakleet Subdistricts, which share a common boundary, consistently attract commercial markets due to larger volumes of fish and better transportation services. Management actions typically encompass both subdistricts because salmon tend to intermingle and the harvest in one subdistrict affects the movement of fish to the adjacent subdistrict. As stated earlier, the department's test net in the Unalakleet River and subsistence interviews at Unalakleet are used to set early fishing periods in both subdistricts. As the season progresses, the test net, commercial catch indices, and the North River counting tower which is operated in cooperation with Kawarak Corporation, are used to assess return strengths of each salmon species. Aerial surveys are frequently not obtained in either subdistrict due to poor survey conditions and are only useful for late season escapement assessment because of the long travel time between the fishery and the spawning grounds (Table 4).

Commercial fishing is typically only allowed after chinook salmon have been observed entering the Unalakleet River in increasing numbers over a seven day time period to assure the harvest is directed on actively migrating stock and not on milling fish. In 1999, the run timing was late with the first fishing periods for chinook salmon in both subdistricts not starting until July 2 for 24 hours to test the salmon abundance (Table 5 and 6). The commercial catches were low and the Department's test net index indicated the run was late or possibly weak. Three additional periods were announced with reduced fishing time. Catch per unit of effort data from each opening was used as a test of run strength. The Chinook salmon return was poor and commercial fishing was redirected to chum salmon on July 15 in both subdistricts utilizing mesh size restrictions. The purpose of that period was to also test the abundance of chum salmon, which yielded poor results. It was apparent from the low commercial harvest and escapement indicators that the chum salmon return was too weak to support further commercial harvest. Therefore, no additional chum salmon directed commercial periods were scheduled.

On July 29, both subdistricts opened to a reduced length coho salmon test period. The run timing was lagging, but there were conflicting reports of very successful sport catches in the Unalakleet River. A series of fishing periods were announced, each one separately, with reduced fishing time. Fishing effort and catches were low. The return was assessed to be below average with escapement marginal. As a result, both commercial fishing time and sport fish bag limits were reduced. The commercial season ended early with a final 48 hour period.

The 1999 commercial harvest in the Shaktoolik Subdistrict included 581 chinook, 2,398 coho, and 2,181 chum salmon harvested by 15 permit holders (Table 1 and 5). The chinook salmon harvest was 57% below the recent 5-year average and 63% below the recent 10 year average (Appendix Table A6). The coho salmon harvest was 78% below the recent 5-year average and 77% below the recent 10-year average. The total chum salmon harvest in the Shaktoolik Subdistrict was 70% below the recent 5-year average and 86% below the recent 10-year average harvest.

The Unalakleet Subdistrict total commercial harvest, by 45 permit holders, included 1,927 chinook, 10,264 coho, and 5,700 chum salmon (Table 1 and 6). The chinook salmon catch was 69% below the recent 5-year average and 65% below the recent 10-year average (Appendix Table A7). The coho salmon harvest in the subdistrict was 75% below the recent 5-year average and 77% below the recent 10-year average. The chum salmon harvest was 58% below the recent 5-year average and 75% below the recent 10-year average.

Escapement

Table 4 summarizes escapement assessments for the major index river systems of the Norton Sound and Port Clarence Districts. These descriptions are often qualitative assessments described relative to historical returns. Some of the chum salmon assessments are described relative to more formalized biological escapement goals (BEG's) for index areas. These BEG's are not historic averages in all cases, but reflect a specific desired level of escapement. BEG's are usually an index of return strength based on peak aerial surveys or counting tower passage estimates.

Department escapement projects in the Norton Sound District include counting towers on the Kwiniuk and Niukluk Rivers, a test net operated on the Unalakleet River, and a weir on the Nome River. Both the Unalakleet test net and the Kwiniuk tower projects have been in operation for many years. They provide comparable and timely information that is used as a basis for inseason salmon management decisions. The Nome River weir was initiated as a counting tower project late in 1993 and was operational as a tower in 1994 and 1995 before switching to a functional weir in 1996. The Niukluk tower became operational in 1995. Both the Nome and Niukluk River projects have limited years of data that can be used when making comparisons, but have proven to be reliable and will become more valuable the longer they operate. The Shaktoolik River counting tower was not operated in 1999.

Budget cuts required a downsizing of the Department's programs. Since the Shaktoolik tower had washed out three years in a row, it was decided to discontinue the project.

Four additional counting tower projects were also operated in the management area this season. The Snake, Eldorado, Pilgrim, and North River projects were setup and operated by Kawarak Corporation. These projects are cooperative ventures with the Department of Fish and Game who provided technical advice and purchased some equipment. These projects supplied important daily information to the Department that was very useful to the management of local salmon resources and will become more important the longer they run.

Aerial survey assessment conditions were fair to good in the northern subdistricts for most of the 1999 season, but poor to unacceptable in the eastern subdistricts. As usual, the Nome Subdistrict streams received the most intensive assessment efforts because salmon stocks in the Nome area are strictly regulated, easily accessed by road system, and are exposed to intensive subsistence and sport fishing pressure.

Chinook Salmon. The Unalakleet and Shaktoolik Subdistricts are the primary chinook salmon producers in Norton Sound. The Norton Bay, Moses Point and Golovin Subdistricts have also experienced a gradual increasing abundance of chinook salmon returns during recent years. Overall, the 1999 chinook salmon return was below average throughout the Norton Sound District. Eastern Norton Sound streams generally produce larger runs and therefore, support larger harvests. No aerial surveys of chinook salmon were completed due to poor conditions. The Unalakleet test net, the Kwiniuk and Niukluk towers, commercial catch rates, and subsistence reports were the primary assessment tools for judging chinook salmon run strength. All indicators suggested chinook salmon escapements were one half to one third of average levels throughout Norton Sound.

Chum Salmon. Chum salmon escapements in 1999 were well below average throughout most of the management area. Survey conditions were good in the Nome Subdistrict where chum salmon escapements were estimated to be one quarter to one half the established escapement goals. The Nome River weir and counting towers on the Snake and Eldorado Rivers agree with the aerial survey assessment of very low chum salmon escapements. No other aerial surveys in Norton Sound for chum salmon were obtained this season due to poor survey conditions. The Niukluk counting tower is used as an index for the Golovin Bay Subdistrict. The estimated chum salmon passage during 1999 was one half the recent 5-year average. Likewise, the Kwiniuk tower in the Moses Point Subdistrict had a chum salmon count one half the escapement goal. The Shaktoolik Subdistrict had escapements well below average, while both the Ungalik River and Unalakleet River, to either side of the Shaktoolik, indicated near average escapements of chum salmon.

Coho Salmon. Coho salmon are found in nearly all of the chum salmon producing streams throughout Norton Sound with the primary commercial contributors being the Unalakleet and Shaktoolik Rivers. Because inclement weather is normally experienced in this area during August and September, escapement data can frequently be incomplete. However, streams in the northern subdistricts of Norton Sound are typically surveyed under more acceptable conditions. The Unalakleet River test net has the most complete data set to evaluate coho salmon escapement in the eastern subdistricts. The newer Nome area assessment projects are intended to monitor coho salmon as well as chum salmon and are becoming more important to fisheries management. The 1999 coho salmon return to the northern subdistricts had well below average escapements while eastern Norton Sound escapements were near average. Even though the Unalakleet test net suggested coho salmon escapements were below average, an early aerial survey of the North River, a tributary to the Unalakleet River, determined that coho salmon in the river were already at the low end of the desired BEG range. With the continued fisheries restrictions, it was felt that coho salmon escapements to the Unalakleet Subdistricts were adequate for 1999.

Pink Salmon. During recent years, pink salmon returns to Norton Sound have followed an odd/even year cycle with the even year returns typically much larger in size than the odd years. The 1999 low returns were very evident throughout Norton Sound, in many cases the lowest on record. It is normal for the run timing of weak returns to arrive later than strong returns. The combination of the 1999 season being delayed by approximately two weeks due to a late spring breakup and a weak run, resulted in pink salmon peaking nearly one month later than on strong even year returns.

Sockeye Salmon. Sockeye salmon are typically found in small numbers throughout Norton Sound with the exception of Glacial Lake where approximately 1,000 fish return to spawn each year. Port Clarence is the salmon district immediately to the northwest of Norton Sound and has a spawning population approaching 10,000 fish in recent years returning to Salmon Lake. No commercial fisheries targeted these stocks in many years due to their low abundance and importance to subsistence users. Aerial surveys in 1999 for Glacial Lake counted 425 fish, which is about 50% below average. Conversely, an aerial survey estimate of 31,700 sockeye salmon in Salmon Lake was well above expectations and approximately 3 times the recent average. Populations in other streams are so small that they are not usually counted and there could easily be a three-fold increase without notice.

Management Issues

- Depressed Chum Salmon Abundance

Chum salmon stocks have been depressed throughout Norton Sound over the past ten to twelve years with escapements in the northern subdistricts continuing to be a major concern. Most chum salmon escapement goals were not met in 1999, even in many instances with drastic reductions in all forms of harvest. The Nome Subdistrict was closed again in 1999 during the entire chum salmon run to sport and commercial fishing. Subsistence fishery

management now requires the full attention of a biologist who manages on a stream-by-stream basis and implements a newly created Tier II fishery management plan. All streams and half the marine waters in the Nome Subdistrict were closed to directed chum salmon subsistence fishing for the majority of the 1999 season. The Golovin Bay and Moses Point Subdistricts fell well short of their escapement goals with no commercial harvest allowed. Eastern Norton Sound streams were thought to have had adequate chum salmon escapements, but only one reduced chum salmon commercial test opening was allowed for the entire season. The Eldorado and Kwiniuk Rivers were removed as "Rivers of Concern" because they attained their chum salmon escapement goals in each of the last four years. However, both streams continue to have depressed total returns which can support only small harvests. Even though escapement goals are generally being attained for most index streams in recent years, chum salmon harvests will continue to be managed conservatively to assure future runs.

- Chum Salmon Run Timing

The 1999 chum salmon return to the Nome Subdistrict was thought to be late because of the late ice breakup, so people were optimistic that the run was simply delayed. However, it soon became apparent that the run was actually very poor. In this case, the subsistence strategy of harvesting a small amount of chum salmon early resulted in an over-harvest. Fishers need to be aware that late runs typically result in poor runs. Therefore, it is important to manage the early portions of late runs conservatively to prevent overharvest and to ensure meeting escapement goals.

- Chum Salmon Stock Rehabilitation

Rehabilitation efforts on poor years such as 1999 need to be considered carefully. At what level is the run too small to sacrifice a portion in hopes of increasing returns artificially? The 1999 Nome area chum salmon egg takes were canceled because it was felt the return to the artificially produced stock would exceed the wild stock return. This would be contrary to the genetic policy.

- Declining Salmon Markets

Salmon marketing conditions have become significant factors for consideration when scheduling fishing periods. Market conditions have caused more restrictive limitations than biological factors in some recent years for many species. Fish buyers frequently notify the Department of Fish and Game that they can only handle a limited quantity of fish with a high quality standard and at a specific rate to optimize their operations. The fishery manager must not only monitor the salmon returns and harvest rates, but must also coordinate schedules with the salmon buyers to protect the limited markets available for Norton Sound salmon. There are some people who feel that as western Alaska fisheries dwindle, the markets will relocate elsewhere. When or if the stocks rebound, it is feared there will be little market interest in salmon from western Alaska, since the markets have become established where stocks are more consistent and have fewer logistic problems and lower transportation cost.

- Increasing Sport Fishery Participation

As a result of reduced subsistence opportunities, overcrowding of other areas, and the increased capabilities of individuals, sport fishing is gaining popularity. Sport fish bag limits are being reviewed, but potential harvest and effort is becoming an important consideration when planning commercial fishing schedules. Commercial and subsistence management actions must be coordinated with the local sport fisheries.

2000 Norton Sound Salmon Outlook

Salmon outlooks and harvest projections for the 2000 commercial salmon season are based on qualitative assessments of brood year returns, subjective determinations of freshwater over-wintering and ocean survival, and projections of local market conditions. Salmon buyers will probably operate in only some of the Norton Sound subdistricts during 2000. The chinook return may be well below average with a commercial harvest ranging from 2,000 to 4,000 fish. A pink salmon market is likely to be available in 2000. The pink salmon harvests during even years are more than sufficient to provide for the recent harvest goal of 500,000 pink salmon. The 2000 chum salmon return is expected to be below average, while the market for Norton Sound chum will likely be minimal. The commercial harvest of chum salmon will be managed conservatively to provide a potential harvest between 20,000 and 30,000. The 1996 coho salmon return is the parent year for the 2000 return. The 1996 coho salmon commercial harvest and escapements suggest that the 2000 coho return may be above average and the commercial harvest could range from 50,000 to 80,000 fish.

Table 1. Norton Sound commercial salmon harvest summary by subdistrict, 1999.

		Subdistricts					Total	
		1	2	3	4	5	6	Number
Number of Fishermen		0	0	0	0	15	45	60
Chinook	Number	0	0	0	0	581	1,927	2,508
	Weight(lbs.)	0	0	0	0	12,395	36,026	48,421
Sockeye	Number	0	0	0	0	0	0	0
	Weight(lbs.)	0	0	0	0	0	0	0
Coho	Number	0	0	0	0	2,398	10,264	12,662
	Weight(lbs.)	0	0	0	0	16,683	71,354	88,037
Pink	Number	0	0	0	0	0	0	0
	Weight(lbs.)	0	0	0	0	0	0	0
Chum	Number	0	0	0	0	2,181	5,700	7,881
	Weight(lbs.)	0	0	0	0	16,904	40,752	57,656
Totals	Number	0	0	0	0	5,160	17,891	23,051
	Weight(lbs.)	0	0	0	0	45,982	148,132	194,114

Table 1. Norton Sound commercial salmon harvest summary by subdistrict, 2000.

		Subdistricts					Total	
		1	2	3	4	5	6	Number
Number of Fishermen		0	12	13	0	26	48	79
Chinook	Number	0	0	10	0	160	582	752
	Weight(lbs.)	0	0	146	0	3,058	8,036	11,240
Sockeye	Number	0	0	0	0	3	11	14
	Weight(lbs.)	0	0	0	0	25	93	118
Coho	Number	0	1,645	5,182	0	7,779	29,803	44,409
	Weight(lbs.)	0	14,147	36,667	0	57,887	198,864	307,565
Pink	Number	0	17,408	46,369	0	85,493	17,278	166,548
	Weight(lbs.)	0	38,416	103,455	0	191,020	36,909	369,800
Chum	Number	0	164	535	0	2,751	2,700	6,150
	Weight(lbs.)	0	900	3,456	0	19,822	16,120	40,298
Totals	Number	0	19,217	52,096	0	96,186	50,374	217,873
	Weight(lbs.)	0	53,463	143,724	0	271,812	260,022	729,021

Table 2. Tier I subsistence salmon harvest by Nome area fishers, Norton Sound, 2000.

	Number of Permits			Number of Salmon Harvested					
	Issued	Returned	Fished	Chinook	Sockeye	Coho	Pink	Chum	Total
Marine Waters	33	26	10	0	33	69	379	57	538
Nome River	18	15	8	0	1	239	130	14	384
Snake River	2	1	1	0	0	8	6	0	14
Eldorado River	21	17	9	0	0	8	708	298	1,014
Flambeau River	5	2	2	0	3	193	0	0	196
Bonanza River	10	6	4	0	0	90	61	30	181
Safety Sound	4	2	1	0	0	0	0	0	0
Solomon River	5	4	2	0	0	0	92	0	92
Penny River	0	0	0	0	0	0	0	0	0
Cripple Creek	0	0	0	0	0	0	0	0	0
Sinuk River	1	1	1	0	0	7	86	0	93
Feather River	0	0	0	0	0	0	0	0	0
Fish River	0	0	0	0	0	0	0	0	0
Niukluk River	6	4	3	7	0	74	0	0	81
Port Clarence	0	0	0	0	0	0	0	0	0
Kuzitrin River	1	1	1	0	0	0	0	0	0
Pilgrim River	11	5	3	2	31	36	12	11	92
Unknown River	0	0	0	0	0	0	0	0	0
Total	117	84	45	9	68	724	1,474	410	2,685

Table 3. Tier II subsistence salmon harvest by Nome area fishers, Norton Sound, 2000.

	Number of Permits			Number of Salmon Harvested					
	Issued	Returned	Fished	Chinook	Sockeye	Coho	Pink	Chum	Total
Marine Waters	9	9	5	7	17	99	1,235	158	1,516
Nome River	0	0	0	0	0	0	0	0	0
Snake River	0	0	0	0	0	0	0	0	0
Eldorado River	0	0	0	0	0	0	0	0	0
Flambeau River	0	0	0	0	0	0	0	0	0
Bonanza River	0	0	0	0	0	0	0	0	0
Safety Sound	0	0	0	0	0	0	0	0	0
Solomon River	0	0	0	0	0	0	0	0	0
Penny River	0	0	0	0	0	0	0	0	0
Cripple Creek	0	0	0	0	0	0	0	0	0
Unknown River	0	0	0	0	0	0	0	0	0
Total	9	9	5	7	17	99	1,235	158	1,516

Table 2. Tier I subsistence salmon harvest by Nome area fishers, Norton Sound, 1999.

	Number of Permits			Number of Salmon Harvested					
	Issued	Returned	Fished	Chinook	Sockeye	Coho	Pink	Chum	Total
Marine Waters	37	31	6	3	31	8	3	38	83
Nome River	12	9	4	0	8	46	2	7	63
Snake River	4	3	2	0	0	12	11	8	31
Eldorado River	11	11	5	0	12	69	11	32	124
Flambeau River	7	4	3	0	2	0	5	32	39
Bonanza River	12	11	3	1	0	9	20	18	48
Safety Sound	1	1	1	0	0	7	0	0	7
Solomon River	1	1	1	0	0	10	5	5	20
Penny River	0	0	0	0	0	0	0	0	0
Cripple Creek	0	0	0	0	0	0	0	0	0
Sinuk River	3	1	0	0	0	0	0	0	0
Feather River	0	0	0	0	0	0	0	0	0
Fish River	0	0	0	0	0	0	0	0	0
Niukluk River	9	6	4	0	0	85	27	270	382
Port Clarence	0	0	0	0	0	0	0	0	0
Kuzitrin River	2	2	2	0	0	0	0	0	0
Pilgrim River	33	20	11	28	180	20	0	91	319
Unknown River	4	2	0	0	0	0	0	0	0
Total	136	102	42	32	233	266	84	501	1,116

Table 3. Tier II subsistence harvest by Nome area fishers, Norton Sound, 1999.

	Number of Permits			Number of Salmon Harvested					Total
	Issued	Returned	Fished	Chinook	Sockeye	Coho	Pink	Chum	
Marine Waters	17	16	6	7	32	0	1	197	237
Nome River	0	0	0	0	0	0	0	0	0
Snake River	0	0	0	0	0	0	0	0	0
Eldorado River	0	0	0	0	0	0	0	0	0
Flambeau River	0	0	0	0	0	0	0	0	0
Bonanza River	0	0	0	0	0	0	0	0	0
Safety Sound	0	0	0	0	0	0	0	0	0
Solomon River	0	0	0	0	0	0	0	0	0
Penny River	0	0	0	0	0	0	0	0	0
Cripple Creek	0	0	0	0	0	0	0	0	0
Sinuk River	0	0	0	0	0	0	0	0	0
Feather River	0	0	0	0	0	0	0	0	0
Unknown River	0	0	0	0	0	0	0	0	0
Total	17	16	6	7	32	0	1	197	237

Table 4. Salmon survey counts of Norton Sound streams and associated chum salmon escapement goals, 1999.

Stream Name	Chinook	Coho	Sockeye	Pink	Chum	Chum BEG Range
Salmon L.			31,720			
Grand Central R.			1,780			
Pilgrim R.	11	754	308		487	
Glacial L.			425			
Sinuk R.		217	550	180	1,697	3,600 - 7,200
Cripple R.		101		275	200	
Penny R.		105		10	15	
Snake R.		260		200	400	800 - 1,600
Nome R.		620		345	375	1,600 - 3,200
Flambeau R.					55	Combined
Eldorado R.		45		6	1,741	5,200 - 10,400
Bonanza R.				245	361	1,000 - 1,900
Solomon R.		62		90	51	300 - 550
Fish R. ^a		821		20	50	Combined
Boston Cr. ^a		319				23,200 - 46,400
Niukluk R. ^a		619			640	
Ophir Cr. ^a		61				
Kwiniuk R.	114 ^c	223		466 ^c	8,342 ^c	15,600 - 31,200
Tubutulik R. ^b						13,600 - 27,200
Inglutalik R. ^b						
Ungalik R. ^a		703		4,100	2,260	
Shaktoolik R. ^a		710		820	1,640	
Unalakeet R. ^a	3	78				Combined
Old Woman R. ^a		37			5	2,400 - 4,800
North R.	18	533 ^c		3,790	1,480	

Note: A multitude of factors affect escapement estimates. The numbers above are strict values that are instantaneous counts which alone do not truly represent the strength of the return. Chum goals pertain to aerial surveys in all cases except for Kwiniuk River which has counting tower goal. Refer to text for an evaluation of the return.

^a Counts should be considered minimums due to counting conditions.

^b No surveys due to counting conditions.

^c Preliminary expanded tower counts.

^d Chum goal for tower count.

^e Coho BEG Range on the North River is 550 to 1,100.

Table 5. Commercial salmon set gillnet catches from Shaktoolik, Subdistrict 5, Norton Sound, 1999.

Period	Hrs. Fished	Date	Permits	Period Catch and Catch Per Unit Effort							Cumulative Catch and Catch Per Unit Effort								
				Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE
1	24	7/2-7/3	5	70	0.58	24	0.20					70	0.58	24	0.20				
2	24	7/5-7/6	11	128	0.48	41	0.16					198	0.52	65	0.17				
3	24	7/8-7/9	11	265	1.00	353	1.34					463	0.71	418	0.65				
4	24	7/12-7/13	8	94	0.49	58	0.30					557	0.66	476	0.57				
5	24	7/15-7/16	6	24	0.17	1,187	8.24					581	0.59	1,663	1.69				
6	24	7/29-7/30	0									581		1,663	1.69				
7	24	8/2-8/3	9			150	0.69			219	1.01	581		1,813	1.51			219	1.01
8	24	8/5-8/6	8			111	0.58			568	2.96	581		1,924	1.38			787	1.93
9	24	8/9-8/10	8			158	0.82			341	1.78	581		2,082	1.31			1,128	1.88
10	24	8/12-8/13	8			9	0.05			146	0.76	581		2,091	1.18			1,274	1.61
11	24	8/16-8/17	11			49	0.19			660	2.50	581		2,140	1.05			1,934	1.83
12	24	8/19-8/20	5			29	0.24			177	1.48	581		2,169	1.00			2,111	1.80
13	24	8/26-8/27	7			7	0.04			168	1.00	581		2,176	0.93			2,279	1.70
14	24	8/30-8/31	3			3	0.04			75	1.04	581		2,179	0.91			2,354	1.66
15	48	9/2-9/4	2			2	0.02			44	0.46	581		2,181	0.87			2,398	1.59

Total hours fished = 384

Total number of permits fished = 15

Table 6. Commercial salmon set gillnet catches from Unalakleet, Subdistrict 6, Norton Sound, 1999.

Period	Hrs. Fished	Date	Permits	Period Catch and Catch Per Unit Effort							Coho CPUE	Cumulative Catch and Catch Per Unit Effort							Coho CPUE
				Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho		Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	
1	24	7/2-7/3	38	1,039	1.14	786	0.86					1,039	1.14	786	0.86			0	
2	24	7/5-7/6	16	235	0.61	579	1.51					1,274	0.98	1,365	1.05			0	
3	24	7/8-7/9	26	523	0.84	1,109	1.78					1,797	0.94	2,474	1.29			0	
4	24	7/12-7/13	20	80	0.17	757	1.58					1,877	0.78	3,231	1.35			0	
5	24	7/15-7/16	12	42	0.15	1,300	4.51					1,919	0.71	4,531	1.69			0	
6	24	7/29-7/30	2	0	0.00	61	1.27			12	0.25	1,919	0.70	4,592	1.68			12	0.25
7	24	8/2-8/3	14	0	0.00	236	0.70			281	0.84	1,919	0.62	4,828	1.57			293	0.76
8	24	8/5-8/6	12	3	0.01	122	0.42			633	2.20	1,922	0.57	4,950	1.47			926	1.38
9	24	8/9-8/10	18	1	0.00	214	0.50			1,303	3.02	1,923	0.82	5,164	1.36			2,229	2.02
10	24	8/12-8/13	14	0	0.00	59	0.18			910	2.71	1,923	0.72	5,223	1.27			3,139	2.18
11	24	8/16-8/17	21	0	0.00	154	0.31			2,397	4.76	1,923	0.60	5,377	1.16			5,536	2.85
12	24	8/19-8/20	19	2	0.00	92	0.20			846	1.86	1,925	0.53	5,469	1.07			6,382	2.66
13	24	8/26-8/27	15	1	0.00	124	0.34			1,319	3.66	1,926	0.48	5,593	1.03			7,701	2.79
14	24	8/30-8/31	15	1	0.00	31	0.09			372	1.03	1,927	0.44	5,624	0.97			8,073	2.59
15	48	9/2-9/4	16			76	0.10			2,191	2.85	1,927	0.38	5,700	0.87			10,264	2.64

Total hours fished = 384

Total number of permits fished = 45

Table 7. 1999 Norton Sound area subsistence salmon harvests

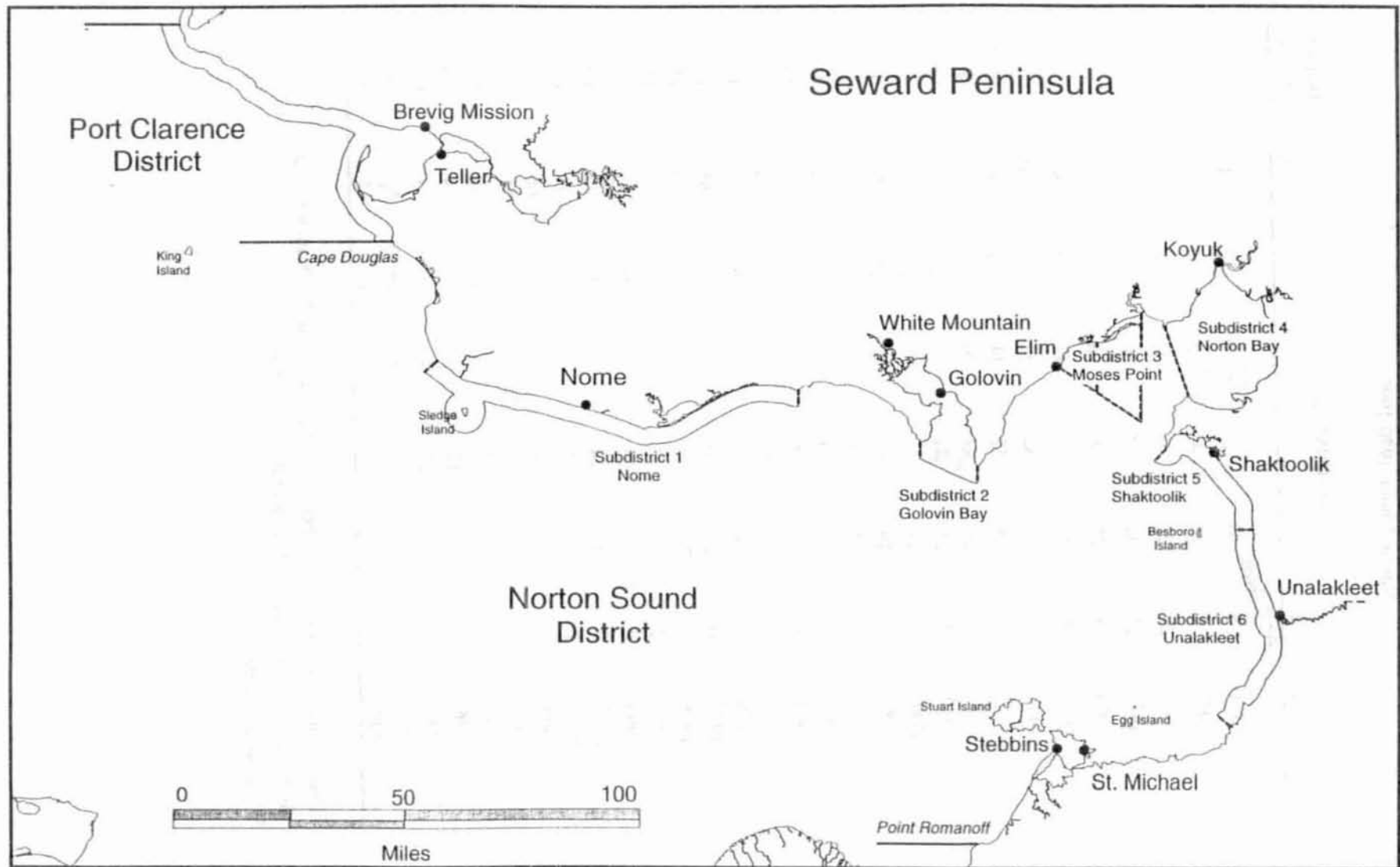
			Chinook		Chum		Pink		Sockeye		Coho		Total	
	Total HH's	HH's Contacted	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total
Nome Permits ^b	109	90	11	11	337	337	58	58	85	85	161	161	652	652
Subdistrict 1	109	90	11	11	337	337	58	58	85	85	161	161	652	652
Golovin	45	37	46	56	1,402	1,692	142	172	40	48	648	784	2,278	2,751
Niukluk R. Permits ^b	9	6	0	0	270	270	27	27	0	0	85	85	382	382
White Mountain	67	62	4	4	1,626	1,694	260	271	0	0	351	365	2,241	2,334
Subdistrict 2	121	105	50	60	3,298	3,656	429	469	40	48	1,084	1,234	4,901	5,467
Elim	78	72	390	424	685	744	1,438	1,564	12	13	896	975	3,421	3,720
Subdistrict 3	78	72	390	424	685	744	1,438	1,564	12	13	896	975	3,421	3,720
Koyuk	72	67	314	327	3,959	4,153	1,855	1,943	0	0	160	167	6,288	6,590
Subdistrict 4	72	67	314	327	3,959	4,153	1,855	1,943	0	0	160	167	6,288	6,590
Shaktoolik	57	55	779	818	445	467	4,852	5,092	174	183	1,482	1,556	7,732	8,116
Subdistrict 5	57	55	779	818	445	467	4,852	5,092	174	183	1,482	1,556	7,732	8,116
Unalakleet ^c	228	209	2,410	2,691	2,508	3,692	8,895	10,067	492	537	7,287	8,140	21,592	25,127
Subdistrict 6	228	209	2,410	2,691	2,508	3,692	8,895	10,067	492	537	7,287	8,140	21,592	25,127
Stebbins	132	111	603	760	2,629	3,312	364	459	158	200	1,046	1,312	4,800	6,043
St. Michael	101	83	896	1,053	2,579	3,036	312	365	95	111	681	798	4,563	5,363
South Norton Sound	233	194	1,499	1,813	5,208	6,348	676	824	253	311	1,727	2,110	9,363	11,406
NORTON SOUND	898	792	5,453	6,144	16,440	19,398	18,203	20,017	1,056	1,177	12,797	14,342	53,949	61,078

^a Data from contacted households were expanded to households not contacted. If less than 30 and less than 50% of households in a community were contacted, then reported harvest is used for estimated harvest. SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1999.

^b Alaska Department of Fish and Game, Division of Commercial Fisheries, permit returns, 1999. Data not expanded.

^c Estimated salmon harvest in Unalakleet includes 61 chinook, 955 chum, 359 pink, and 187 coho from the ADF&G test net fishery in addition to the survey results.

Figure 1. The commercial salmon fishing districts and subdistricts of Norton Sound and Port Clarence.



Appendix Table A1. Number of commercial salmon permits fished,
Norton Sound, 1970-1999.

Year	SUBDISTRICT						District ^a
	1	2	3	4	5	6	Totals
1970	6	33	21	0	12	45	^b
1971	7	22	45	6	19	72	^b
1972	20	20	48	32	20	71	^b
1973	21	34	57	30	27	94	^b
1974	25	25	60	8	23	53	^b
1975	24	42	67	42	39	61	^b
1976	21	22	54	27	37	60	^b
1977	14	25	52	24	30	45	164
1978	16	24	44	26	26	51	176
1979	15	21	41	22	29	63	175
1980	14	17	26	13	26	66	159
1981	15	19	33	10	26	73	167
1982	18	17	28	10	32	68	164
1983	19	21	39	15	34	72	170
1984	8	22	25	8	24	74	141
1985	9	21	34	12	21	64	155
1986	13	24	34	9	30	73	163
1987	10	21	34	12	39	65	164
1988	5	21	36	13	21	69	152
1989	2	0	13	0	26	73	110
1990	0	15	23	0	28	73	128
1991	0	16	24	0	25	75	126
1992	2	1	21	9	25	71	110
1993	1	8	26	15	37	66	153
1994	1	5	21	0	39	71	119
1995	2	7	12	0	26	58	105
1996	1	4	12	0	20	54	86
1997	0	11	21	9	19	57	102
1998	0	16	23	0	28	52	82
1999	0	0	0	0	15	45	60

^a District total is the number of fishermen that actually fished in Norton Sound;
Some fishermen may have fished more than one subdistrict.

^b Data not available

Appendix Table A2. Commercial and subsistence salmon catches by species, by year in Nome Subdistrict, Norton Sound District, 1964-1999^c

NOME (SUBDISTRICT 1)																		
Commercial							Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1964	5	-	-	1	1,194	1,200	-	-	-	-	-	-	5	-	-	1	1,194	1,200
1965	1	-	-	193	1,941	2,135	-	-	-	780	1,825	2,605	1	-	-	973	3,766	4,740
1966	1	-	32	1	581	615	12	-	-	1,794	1,762	3,568	13	-	32	1,795	2,343	4,183
1967	-	-	-	72	406	478	11	-	-	349	627	987	11	-	-	421	1,033	1,465
1968	-	-	-	50	102	152	7	-	-	6,507	621	7,135	7	-	-	6,557	723	7,287
1969	-	-	63	330	601	994	2	-	-	3,649	508	4,159	2	-	63	3,979	1,109	5,153
1970	-	-	6	55	960	1,021	-	-	35	5,001	458	5,494	0	-	41	5,056	1,418	6,515
1971	11	-	-	14	2,315	2,340	-	-	122	5,457	2,900	8,479	11	-	122	5,471	5,215	10,819
1972	15	-	-	12	2,643	2,670	19	-	52	4,684	315	5,070	34	-	52	4,696	2,958	7,740
1973	-	-	-	321	1,132	1,453	14	-	120	5,108	1,863	7,105	14	-	120	5,429	2,995	8,558
1974	19	-	123	7,722	10,431	18,295	8	-	5	3,818	183	4,014	27	-	128	11,540	10,614	22,309
1975	2	-	319	2,163	8,364	10,848	2	-	97	6,267	2,858	9,224	4	-	416	8,430	11,222	20,072
1976	2	10	26	1,331	7,620	8,989	13	-	189	5,492	1,705	7,399	15	10	215	6,823	9,325	16,388
1977	8	-	58	65	15,998	16,129	35	-	498	2,773	12,192	15,498	43	-	556	2,838	28,190	31,627
1978	19	-	-	22,869	8,782	31,670	35	-	225	13,063	4,295	17,618	54	-	225	35,932	13,077	49,288
1979	9	-	29	5,860	5,391	11,289	11	-	1,120	6,353	3,273	10,757	20	-	1,149	12,213	8,664	22,046
1980	8	-	-	10,007	13,922	23,937	129	-	2,157	22,246	5,983	30,515	137	-	2,157	32,253	19,905	54,452
1981	4	-	508	3,202	18,666	22,380	35	14	1,726	5,584	8,579	15,938	39	14	2,234	8,786	27,245	38,318
1982	20	-	1,183	18,512	13,447	33,162	21	6	1,829	19,202	4,831	25,869	41	6	3,012	37,714	18,278	59,051
1983	23	-	261	308	11,691	12,283	74	53	1,911	8,086	7,091	17,215	97	53	2,172	8,394	18,782	29,498
1984	7	-	820	-	3,744	4,571	83	16	1,795	17,182	4,883	23,959	90	16	2,615	17,182	8,627	28,530
1985	21	-	356	-	6,219	6,596	56	114	1,054	2,117	5,667	9,008	77	114	1,410	2,117	11,886	15,604
1986	6	-	50	-	8,160	8,216	150	107	688	8,720	8,085	17,750	156	107	738	8,720	16,245	25,966
1987	3	-	577	-	5,646	6,226	200	107	1,100	1,251	8,394	11,052	203	107	1,677	1,251	14,040	17,278
1988	2	-	54	182	1,628	1,866	63	133	1,076	2,159	5,952	9,383	65	133	1,130	2,341	7,580	11,249
1989	2	0	0	123	492	617	24	131	469	924	3,399	4,947	26	131	469	1,047	3,891	5,564
1990	0	0	0	0	0	0	58	234	510	2,233	4,246	7,281	58	234	510	2,233	4,246	7,281
1991	0	0	0	0	0	0	83	166	1,279	194	3,715	5,437	83	166	1,279	194	3,715	5,437
1992	1	2	693	185	881	1,762	152	163	1,481	7,351	1,684	10,831	153	165	2,174	7,536	2,565	12,593
1993	0	2	611	0	132	745	52	80	2,070	873	1,766	4,841	52	82	2,681	873	1,898	5,586
1994	0	1	287	0	66	354	23	69	983	6,556	1,673	9,304	23	70	1,270	6,556	1,739	9,658
1995	0	1	369	0	122	492	36	211	1,897	486	5,344	7,974	36	212	2,266	486	5,466	8,466
1996	0	0	9	13	3	25	19	353	1,317	5,802	4,333	11,824	19	353	1,326	5,815	4,336	11,849
1997	0	0	0	0	0	0	19	99	534	287	4,996	5,936	19	99	534	287	4,996	5,936
1998	0	0	0	0	0	0	15	14	1,057	4,797	964	6,847	15	14	1,057	4,797	964	6,847
1999	0	0	0	0	0	0	11	85	161	58	337	652	11	85	161	58	337	652
5-year avg. ^a	0	0	133	3	38	174	22	149	1,158	3,586	3,462	8,377	22	150	1,291	3,588	3,500	8,551
10-year avg. ^b	0	1	197	32	170	400	48	152	1,160	2,950	3,212	7,522	48	153	1,357	2,982	3,382	7,922

^a 1994-1998^b 1989-1998^c Subsistence harvest are incomplete prior to 1979.

Appendix Table A3 Commercial and subsistence salmon catches by species, by year in Golovin Subdistrict, Norton Sound District, 1962-1999.

GOLOVIN BAY (SUBDISTRICT 2)																		
Commercial							Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	45	11	264	10,276	68,720	79,316	-	-	-	-	-	-	45	11	264	10,276	68,720	79,316
1963	40	40	-	19,677	49,850	69,607	-	-	118	5,702	9,319	15,139	40	40	118	25,379	59,169	84,746
1964	27	40	3	7,236	58,301	65,607	-	-	-	-	-	-	27	40	3	7,236	58,301	65,607
1965	-	-	-	-	-	-	2	-	49	1,523	3,847	5,421	2	-	49	1,523	3,847	5,421
1966	17	14	584	4,665	29,791	35,071	4	-	176	1,573	3,520	5,273	21	14	760	6,238	33,311	40,344
1967	10	-	747	5,790	31,193	37,740	3	-	185	2,774	4,803	7,765	13	-	932	8,564	35,996	45,505
1968	12	-	205	18,428	10,011	28,656	4	-	181	4,955	1,744	6,884	16	-	386	23,383	11,755	35,540
1969	28	-	1,224	23,208	20,949	45,409	2	-	190	2,760	2,514	5,466	30	-	1,414	25,968	23,463	50,875
1970	13	-	3	18,721	20,566	39,303	4	-	353	2,046	2,614	5,017	17	-	356	20,767	23,180	44,320
1971	37	-	197	2,735	33,824	36,793	7	-	191	1,544	1,936	3,678	44	-	388	4,279	35,760	40,471
1972	36	-	20	6,562	27,097	33,715	4	-	62	1,735	2,028	3,829	40	-	82	8,297	29,125	37,544
1973	70	-	183	14,145	41,689	56,087	1	-	48	9	74	132	71	-	231	14,154	41,763	56,219
1974	30	-	3	28,340	30,173	58,546	3	-	-	967	205	1,175	33	-	3	29,307	30,378	59,721
1975	17	-	206	10,770	41,761	52,754	-	-	1	2,011	2,025	4,037	17	-	207	12,781	43,786	56,791
1976	12	-	1,311	24,051	30,219	55,593	-	-	-	1,995	1,128	3,123	12	-	1,311	26,046	31,347	58,716
1977	26	-	426	7,928	53,912	62,292	3	-	80	703	2,915	3,701	29	-	506	8,631	56,827	65,993
1978	22	-	94	72,033	41,462	113,611	1	-	-	2,470	1,061	3,532	23	-	94	74,503	42,523	117,143
1979	75	49	1,606	45,948	30,201	77,879	-	-	845	2,546	2,840	6,231	75	49	2,451	48,494	33,041	84,110
1980	36	36	328	10,774	52,609	63,783	12	-	692	10,727	4,057	15,488	48	36	1,020	21,501	56,666	79,271
1981	23	5	13	49,755	58,323	108,119	8	-	1,520	5,158	5,543	12,229	31	5	1,533	54,913	63,866	120,348
1982	78	5	4,281	39,510	51,970	95,844	7	-	1,289	4,752	1,868	7,916	85	5	5,570	44,262	53,838	103,760
1983	52	10	295	17,414	48,283	66,054	-	-	-	-	-	-	-	-	-	-	-	-
1984	31	-	2,462	88,588	54,153	145,234	-	-	-	-	-	-	-	-	-	-	-	-
1985	193	113	1,196	3,019	55,781	60,302	12	2	430	1,904	9,577	11,925 ^c	205	115	1,626	4,923	65,358	72,227
1986	81	8	958	25,425	69,725	96,197	-	-	-	-	-	-	-	-	-	-	-	-
1987	166	51	2,203	1,579	44,334	48,333	-	-	-	-	-	-	-	-	-	-	-	-
1988	108	921	2,149	31,559	33,348	68,085	-	-	-	-	-	-	-	-	-	-	-	-
1989	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
1990	52	21	0	0	15,993	16,066	-	-	-	-	-	-	-	-	-	-	-	-
1991	49	1	0	0	14,839	14,889	-	-	-	-	-	-	-	-	-	-	-	-
1992	6	9	2,085	0	1,002	3,102	-	-	-	-	-	-	-	-	-	-	-	-
1993	1	4	2	8,480	2,803	11,290	-	-	-	-	-	-	-	-	-	-	-	-
1994	0	0	3,424	0	111	3,535	253	168	733	8,410	1,337	10,901 ^d	253	168	4,157	8,410	1,448	14,436
1995	0	0	1,616	4,296	1,987	7,899	165	34	1,649	7,818	10,373	20,039 ^d	165	34	3,265	12,114	12,360	27,938
1996	0	0	638	0	0	638	86	134	3,014	17,399	2,867	23,500 ^d	86	134	3,652	17,399	2,867	24,138
1997	19	2	102	20	8,003	8,146	138	427	555	4,570	4,891	10,581 ^d	157	429	657	4,590	12,894	18,727
1998	1	0	3	106,761	723	107,488	184	37	1,292	13,340	1,893	16,747 ^d	185	37	1,295	120,101	2,616	124,235
1999	0	0	0	0	0	0	60	48	1,234	469	3,656	5,467 ^d	60	48	1,234	469	3,656	5,467
5-year avg. ^a	4	0	1,157	22,215	2,165	25,541	165	160	1,449	10,307	4,272	16,354	169	160	2,605	32,523	6,437	41,895
10-year avg. ^b	13	4	787	11,956	4,546	17,305	-	-	-	-	-	-	-	-	-	-	-	-

^a 1994-1998^b 1989-1998^c Subsistence survey not conducted.^d Harvest estimated from Div. of Subsistence survey.

Appendix Table A4 Commercial and subsistence salmon catches by species, by year in Moses Point Subdistrict, Norton Sound District, 1962-1999

							MOSES POINT (SUBDISTRICT 3)											
Commercial							Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	27	-	-	11,100	50,683	61,810	-	-	-	-	-	-	27	-	-	11,100	50,683	61,810
1963	15	-	-	2,549	46,274	48,838	5	-	-	5,808	8,316	14,129	20	-	-	8,357	54,590	62,967
1964	32	3	-	3,372	28,568	31,975	-	-	-	63	348	411	32	3	0	3,435	28,916	32,386
1965	-	-	-	-	-	-	16	-	72	1,325	9,857	11,270	16	-	72	1,325	9,857	11,270
1966	17	-	-	2,745	24,741	27,503	14	-	250	2,511	5,409	8,184	31	0	250	5,256	30,150	35,687
1967	-	-	-	-	-	-	39	-	116	1,322	9,913	11,390	39	-	116	1,322	9,913	11,390
1968	12	-	1	9,012	17,908	26,933	2	-	80	6,135	2,527	8,744	14	-	81	15,147	20,435	35,677
1969	29	-	-	11,807	26,594	38,430	9	-	109	1,790	1,303	3,211	38	-	109	13,597	27,897	41,641
1970	39	-	-	13,052	29,726	42,817	16	-	160	4,661	6,960	11,797	55	-	160	17,713	36,686	54,614
1971	95	-	4	822	43,831	44,852	16	-	271	1,046	2,227	3,560	111	-	275	1,968	46,058	48,412
1972	190	-	11	5,866	30,919	36,986	44	-	108	1,579	2,070	3,801	234	-	119	7,445	32,989	40,787
1973	134	-	-	10,603	31,389	42,126	2	-	-	-	298	300	136	-	-	10,603	31,687	42,426
1974	198	-	9	12,821	55,276	68,304	3	-	-	2,382	1,723	4,108	201	-	9	15,203	56,999	72,412
1975	16	-	-	4,407	46,699	51,122	2	-	6	1,280	508	1,796	18	-	6	5,687	47,207	52,918
1976	24	-	232	5,072	10,890	16,218	22	-	-	5,016	1,548	6,586	46	-	232	10,088	12,438	22,804
1977	96	-	6	9,443	47,455	57,000	22	-	225	1,145	1,170	2,562	118	-	231	10,588	48,625	59,562
1978	444	-	244	39,694	44,595	84,977	38	-	407	1,995	1,229	3,669	482	-	651	41,689	45,824	88,646
1979	1,035	-	177	40,811	37,123	79,146	16	-	890	6,078	1,195	8,179	1,051	-	1,067	46,889	38,318	87,325
1980	502	-	-	1,435	14,755	16,692	131	-	229	4,232	1,393	5,985	633	-	229	5,667	16,148	22,677
1981	198	-	5	26,417	29,325	55,945	32	-	2,345	6,530	2,819	11,726	230	-	2,350	32,947	32,144	67,671
1982	253	-	318	9,849	40,030	50,450	1	-	1,835	3,785	3,537	9,158	254	-	2,153	13,634	43,567	59,608
1983	254	-	-	17,027	65,776	83,057	-	-	-	-	-	- ^c	-	-	-	-	-	-
1984	-	-	5,959	28,035	9,477	43,471	-	-	-	-	-	- ^c	-	-	-	-	-	-
1985	816	32	1,803	559	24,466	27,676	67	-	1,389	1,212	947	3,615	883	32	3,192	1,771	25,413	31,291
1986	600	41	5,874	15,795	20,668	42,978	-	-	-	-	-	- ^c	-	-	-	-	-	-
1987	907	15	64	568	17,278	18,832	-	-	-	-	-	- ^c	-	-	-	-	-	-
1988	663	93	3,974	13,703	18,585	37,018	-	-	-	-	-	- ^c	-	-	-	-	-	-
1989	62	0	0	0	167	229	-	-	-	-	-	- ^c	-	-	-	-	-	-
1990	202	0	0	501	3,723	4,426	-	-	-	-	-	- ^c	-	-	-	-	-	-
1991	161	0	0	0	804	965	312	-	2,153	3,555	2,660	8,680 ^d	473	-	2,153	3,555	3,464	9,645
1992	0	0	3,531	0	6	3,537	100	-	1,281	6,152	1,260	8,793 ^d	100	-	4,812	6,152	1,266	12,330
1993	3	0	4,065	0	167	4,235	368	-	1,217	1,726	1,635	4,946 ^d	371	-	5,282	1,726	1,802	9,181
1994	0	0	5,345	0	414	5,759	322	104	1,180	9,345	3,476	14,427 ^d	322	104	6,525	9,345	3,890	20,186
1995	4	44	3,742	2,962	1,171	7,923	284	17	1,353	2,046	3,774	7,474 ^d	288	61	5,095	5,008	4,945	15,397
1996	0	0	1,915	68,609	0	70,524	417	52	1,720	9,442	2,319	13,951 ^d	417	52	3,635	78,051	2,319	84,475
1997	844	0	1,409	0	2,683	4,936	619	50	1,213	1,314	2,064	5,261 ^d	1,463	50	2,622	1,314	4,747	10,197
1998	105	0	1,462	145,669	2,311	149,547	414	49	1,831	6,891	1,376	10,561 ^d	519	49	3,293	152,560	3,687	160,108
1999	0	0	0	0	0	0	424	13	975	1,564	744	3,720 ^d	424	13	975	1,564	744	3,720
5-year avg. ^a	191	9	2,775	43,448	1,316	47,738	411	54	1,459	5,808	2,602	10,335	602	63	4,234	49,256	3,918	58,073
10-year avg. ^b	138	4	2,147	21,774	1,145	25,208	-	-	-	-	-	-	-	-	-	-	-	-

^a 1994-1998^b 1989-1998^c Subsistence survey not conducted.^d Harvest estimated from Div. of Subsistence survey.

Appendix Table A5 Commercial and subsistence salmon catches by species, by year in Norton Bay Subdistrict, Norton Sound District, 1962-1999

NORTON BAY (SUBDISTRICT 4)																		
Commercial							Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	387	7	40	4,402	24,380	29,216	-	-	-	-	-	-	387	7	40	4,402	24,380	29,216
1963	137	2	-	17,676	12,469	30,284	-	-	-	5,097	-	5,097	137	2	-	22,773	12,469	35,381
1964	50	3	-	988	5,916	6,957	-	-	-	-	-	-	50	3	-	988	5,916	6,957
1965	-	-	-	-	-	-	4	-	22	252	3,032	3,310	4	-	22	252	3,032	3,310
1966	-	-	-	-	-	-	7	-	41	929	3,612	4,589	7	-	41	929	3,612	4,589
1967	-	-	-	-	-	-	12	-	14	1,097	2,945	4,068	12	-	14	1,097	2,945	4,068
1968	-	-	-	-	-	-	28	-	71	1,916	1,872	3,887	28	-	71	1,916	1,872	3,887
1969	26	-	-	4,849	3,974	8,849	59	-	189	2,115	3,855	6,218	85	-	189	6,964	7,829	15,067
1970	-	-	-	-	-	-	3	-	10	840	3,500	4,353	3	-	10	840	3,500	4,353
1971	-	-	-	-	-	-	5	-	47	92	2,619	2,763	5	-	47	92	2,619	2,763
1972	43	-	-	1,713	7,799	9,555	30	-	44	2,089	2,022	4,185	73	-	44	3,802	9,821	13,740
1973	28	-	-	1,645	4,672	6,345	1	-	-	10	130	141	29	-	-	1,655	4,802	6,488
1974	21	-	-	654	3,826	4,501	-	-	-	17	900	917	21	-	-	671	4,726	5,418
1975	68	-	89	1,137	17,395	18,679	1	-	93	381	455	69	-	-	89	1,230	17,746	19,134
1976	102	-	95	4,456	7,161	11,814	2	-	-	41	236	279	104	-	95	4,497	7,397	12,093
1977	158	-	1	2,495	13,563	16,217	14	-	-	420	2,055	2,489	172	-	1	2,915	15,618	18,708
1978	470	-	144	8,471	21,973	31,058	12	-	21	1,210	1,060	2,303	482	-	165	9,681	23,033	33,361
1979	856	-	2,547	6,201	15,599	25,203	12	-	697	735	1,400	2,844	868	-	3,244	6,936	16,999	28,047
1980	340	-	-	47	7,855	8,242	22	-	33	4,275	1,132	5,462	362	-	33	4,322	8,987	13,704
1981	83	-	-	177	3,111	3,351	7	-	82	2,314	3,515	5,918	70	-	82	2,491	6,826	9,269
1982	96	-	2,332	2,535	7,128	12,091	1	-	484	2,600	2,485	5,570	97	-	2,816	5,135	9,613	17,661
1983	215	-	204	3,935	17,157	21,511	-	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	1,162	3,442	4,604	-	-	-	-	-	-	-	-	-	-	-	-
1985	528	-	384	68	9,948	10,928	-	-	-	-	-	-	-	-	-	-	-	-
1986	139	2	1,512	40	1,994	3,687	-	-	-	-	-	-	-	-	-	-	-	-
1987	544	-	145	16	3,586	4,291	-	-	-	-	-	-	-	-	-	-	-	-
1988	434	2	709	1,749	7,521	10,415	-	-	-	-	-	-	-	-	-	-	-	-
1989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1990 ^a	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
1991 ^a	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
1992	27	0	0	0	1,787	1,814	-	-	-	-	-	-	-	-	-	-	-	-
1993	267	0	0	290	1,378	1,935	-	-	-	-	-	-	-	-	-	-	-	-
1994	0	0	0	0	0	0	308	1	370	6,049	4,581	11,309 ^a	308	1	370	6,049	4,581	11,309
1995	0	0	0	0	0	0	475	46	985	3,514	5,828	10,848 ^a	475	46	985	3,514	5,828	10,848
1996	0	0	0	0	0	0	295	3	676	3,929	4,161	9,064 ^a	295	3	676	3,929	4,161	9,064
1997	194	0	0	0	531	725	656	54	322	1,795	4,040	6,777 ^a	850	54	322	1,795	4,571	7,502
1998	0	0	0	0	0	0	684	0	388	2,009	6,192	9,274 ^a	684	0	388	2,009	6,192	9,274
1999	0	0	0	0	0	0	327	0	167	1,943	4,153	6,590	327	0	167	1,943	4,153	6,590
5-year avg. ^a	39	0	0	0	106	145	484	21	548	3,459	4,960	9,454	522	21	548	3,459	5,067	9,599
10-year avg. ^b	49	0	0	29	370	447	-	-	-	-	-	-	-	-	-	-	-	-

^a 1994-1998^b 1989-1998^c Subsistence survey not conducted.^d No commercial harvest reported.^e Harvest estimated from Div. of Subsistence survey.

Appendix Table A6. Commercial and subsistence salmon catches by species, by year in Shaktoolik Subdistrict, Norton Sound District, 1961-1999.

SHAKTOOLIK (SUBDISTRICT 5)																		
Commercial							Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1961	140	-	-	29,075	24,746	53,961	-	-	-	-	-	-	140	-	-	29,075	24,746	53,961
1962	1,738	-	2,113	640	8,718	13,209	-	-	-	-	-	-	1,738	-	2,113	640	8,718	13,209
1963	480	11	563	5,138	19,153	25,345	-	-	-	-	-	-	480	11	563	5,138	19,153	25,345
1964	631	79	16	1,969	35,272	37,967	77	-	340	2,132	5,412	7,961	708	79	356	4,101	40,684	45,928
1965	127	30	-	3	8,356	8,516	31	-	107	3,763	3,420	7,321	158	30	107	3,766	11,776	15,837
1966	310	-	956	344	8,292	9,902	142	-	762	1,445	4,183	6,532	452	-	1,718	1,789	12,475	16,434
1967	43	-	88	1,050	1,655	2,836	262	-	387	2,010	4,436	7,095	305	-	475	3,060	6,091	9,931
1968	61	-	130	2,205	2,504	4,900	10	-	458	6,355	1,915	8,738	71	-	588	8,560	4,419	13,638
1969	33	-	276	6,197	8,645	15,151	40	-	193	4,018	3,439	7,690	73	-	469	10,215	12,084	22,841
1970	197	-	155	2,301	15,753	18,406	43	-	210	2,474	2,016	4,743	240	-	365	4,775	17,769	23,149
1971	284	-	238	28	13,399	13,949	87	-	329	494	5,060	5,970	371	-	567	522	18,459	19,919
1972	419	-	11	2,798	12,022	15,250	64	-	235	939	3,399	4,637	483	-	246	3,737	15,421	19,887
1973	289	-	177	6,450	14,500	21,416	51	-	130	3,410	1,397	4,988	340	-	307	9,860	15,897	26,404
1974	583	-	179	5,650	26,391	32,803	93	-	353	1,901	358	2,705	676	-	532	7,551	26,749	35,508
1975	651	2	812	1,774	49,536	52,775	18	-	14	1,394	334	1,760	669	2	826	3,168	49,870	54,535
1976	892	-	129	15,803	15,798	32,622	24	-	121	1,188	269	1,602	916	-	250	16,991	16,067	34,224
1977	1,521	4	418	7,743	36,591	46,277	49	-	170	585	2,190	2,994	1,570	4	588	8,328	38,781	49,271
1978	1,339	7	1,116	46,236	35,388	84,086	81	-	15	3,275	1,170	4,541	1,420	7	1,131	49,511	36,558	88,627
1979	2,377	-	3,383	18,944	22,030	46,734	62	-	1,605	2,575	1,670	5,912	2,439	-	4,988	21,519	23,700	52,646
1980	1,066	-	8,001	1,947	27,453	38,487	57	-	756	3,227	1,827	5,867	1,143	-	8,757	5,174	29,280	44,354
1981	1,484	4	1,191	29,695	21,097	53,471	8	-	525	2,225	3,490	6,248	1,492	4	1,716	31,920	24,587	59,719
1982	1,677	3	22,233	17,019	26,240	67,172	68	-	2,138	3,665	1,165	7,236	1,745	3	24,371	20,884	27,405	74,408
1983	2,742	4	12,877	12,031	67,310	94,964	-	-	-	-	-	-	-	-	-	-	-	-
1984	1,613	-	10,730	1,596	32,309	46,248	-	-	-	-	-	-	-	-	-	-	-	-
1985	5,312	-	2,808	-	13,403	21,523	298	-	1,379	24	298	1,999	5,610	-	4,187	24	13,701	23,522
1986	1,075	29	6,626	-	16,126	23,856	-	-	-	-	-	-	-	-	-	-	-	-
1987	2,214	-	6,193	-	14,088	22,495	-	-	-	-	-	-	-	-	-	-	-	-
1988	671	79	6,096	3,681	21,521	32,048	-	-	-	-	-	-	-	-	-	-	-	-
1989	1,241	43	8,066	0	19,641	28,991	-	-	-	-	-	-	-	-	-	-	-	-
1990	2,644	49	4,695	0	21,748	29,136	-	-	-	-	-	-	-	-	-	-	-	-
1991	1,324	55	11,614	0	31,619	44,612	-	-	-	-	-	-	-	-	-	-	-	-
1992	1,098	56	14,660	0	27,867	43,681	-	-	-	-	-	-	-	-	-	-	-	-
1993	2,756	20	11,130	106,743	20,864	141,513	-	-	-	-	-	-	-	-	-	-	-	-
1994	885	8	22,065	502,231	5,411	530,600	1,175	1	2,777	9,133	1,221	14,307 ^a	2,060	9	24,842	511,364	6,632	544,907
1995	1,239	5	10,856	37,377	14,775	64,252	1,275	2,480	2,626	7,024	2,480	15,885 ^a	2,514	2,485	13,482	44,401	17,255	80,137
1996	1,340	1	13,444	304,982	3,237	323,004	1,114	31	3,615	8,370	4,425	17,555 ^a	2,454	32	17,059	313,352	7,662	340,559
1997	2,449	0	4,694	-	5,747	12,890	1,146	62	2,761	5,779	1,612	11,360 ^a	3,595	62	7,455	5,779	7,359	24,250
1998	910	0	3,624	236,171	7,080	247,785	982	92	1,872	6,270	1,034	10,250 ^a	1,892	92	5,496	242,441	8,114	258,035
1999	581	0	2,398	0	2,181	5,160	818	183	1,556	5,092	467	8,116 ^a	1,399	183	3,954	5,092	2,648	13,278
5-year avg. ^a	1,365	3	10,937	216,152	7,250	235,706	1,138	533	2,730	7,315 [#]	2,154	13,871	2,503	536	13,667	223,467	9,404	249,578
10-year avg. ^b	1,589	24	10,485	118,750	15,799	146,646	-	-	-	-	-	-	-	-	-	-	-	-

^a 1994-1998^b 1989-1998^c Subsistence survey not conducted.^d Harvest estimated from Div. of Subsistence survey.

Appendix Table A7. Commercial and subsistence salmon catches by species, by year in Unalakleet Subdistrict, Norton Sound District, 1961-1999

UNALAKLEET (SUBDISTRICT 6)																		
Commercial							Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1961	5,160	35	13,807	5,162	23,586	47,750	-	-	-	-	-	-	5,160	35	13,807	5,162	23,586	47,750
1962	5,089	-	6,739	6,769	30,283	48,880	-	-	-	-	-	-	5,089	-	6,739	6,769	30,283	48,880
1963	5,941	18	16,202	1,140	27,003	50,304	-	-	-	-	-	-	5,941	18	16,202	1,140	27,003	50,304
1964	1,273	1	79	1	19,611	20,965	488	-	2,227	7,030	6,726	16,471	1,761	1	2,306	7,031	26,337	37,436
1965	1,321	-	2,030	24	26,498	29,873	521	-	4,562	11,488	8,791	25,362 ^a	1,842	-	6,592	11,512	35,289	55,235
1966	1,208	-	4,183	5,023	16,840	27,254	90	-	789	6,083	3,387	10,349 ^a	1,298	-	4,972	11,108	20,227	37,603
1967	1,751	-	1,544	21,961	8,502	33,758	490	-	484	9,964	-	10,938 ^a	2,241	-	2,028	31,925	8,502	44,698
1968	960	-	6,549	41,474	14,865	63,848	186	-	1,493	11,044	2,982	15,705 ^a	1,146	-	8,042	52,518	17,847	79,553
1969	2,276	-	5,273	40,558	22,032	70,139	324	-	1,483	4,230	4,196	10,233 ^a	2,600	-	6,756	44,788	26,228	80,372
1970	1,804	-	4,261	30,779	40,029	76,673	495	-	3,907	10,104	7,214	21,720 ^a	2,099	-	8,168	40,893	47,243	98,393
1971	2,166	-	2,688	1,196	37,543	43,593	911	-	3,137	2,230	7,073	13,351 ^a	3,077	-	5,825	3,426	44,816	56,944
1972	2,235	-	412	28,231	20,440	51,318	643	-	1,818	3,132	4,132	9,725 ^a	2,878	-	2,230	31,363	24,572	61,043
1973	1,397	-	8,922	13,335	25,716	49,370	323	-	213	6,233	3,426	10,195	1,720	-	9,135	19,568	29,142	59,585
1974	2,100	-	1,778	93,332	36,170	133,390	313	-	706	7,341	588	8,948	2,413	-	2,484	100,673	36,758	142,328
1975	1,638	-	3,167	12,137	48,740	65,682	193	-	74	4,758	2,038	7,033	1,801	-	3,241	16,895	50,778	72,715
1976	1,211	1	5,141	37,203	24,268	67,824	142	-	694	4,316	2,832	7,984	1,353	1	5,835	41,519	27,100	75,808
1977	2,591	1	2,781	21,061	32,936	59,410	723	-	1,557	8,870	6,085	17,235	3,414	1	4,338	29,871	39,021	76,845
1978	7,525	5	5,737	136,200	37,079	186,546	1,044	-	2,538	13,268	3,442	20,292	8,569	5	8,275	149,468	40,521	206,838
1979	6,354	8	23,696	49,647	30,445	110,150	640	-	3,330	6,960	1,597	12,527	6,994	8	27,026	56,607	32,942	122,677
1980	4,339	3	21,512	203,142	64,198	293,194	1,046	-	4,758	19,071	5,230	30,105	5,385	3	26,270	222,213	69,428	323,299
1981	6,157	47	29,845	123,233	39,186	198,468	869	24	5,808	5,750	4,235	16,688	7,026	71	35,653	128,983	43,421	215,154
1982	3,768	2	61,343	142,856	44,520	252,489	913	2	7,037	20,045	4,694	32,691	4,681	4	68,380	162,901	49,214	285,180
1983	7,022	13	36,098	26,198	109,220	178,551	1,888	33	6,888	13,808	4,401	26,998	8,890	46	42,986	40,006	113,621	205,549
1984	6,804	8	47,904	-	43,317	98,031	1,650	1	6,675	17,418	3,348	29,092	8,454	7	54,579	17,418	46,665	127,123
1985	12,521	21	15,421	1	25,111	53,175	1,397	3	2,244	55	1,968	5,667	14,018	24	17,665	56	27,079	58,842
1986	4,494	153	20,580	-	30,239	55,466	-	-	-	-	-	- ^a	-	-	-	-	-	-
1987	3,246	141	15,097	97	17,525	36,106	-	-	-	-	-	- ^a	-	-	-	-	-	-
1988	2,218	157	24,232	23,730	25,363	75,700	-	-	-	-	-	- ^a	-	-	-	-	-	-
1989	4,402	222	36,025	-	29,825	61,474	-	-	4,681	17,500	1,388	- ^a	-	-	-	-	-	-
1990	5,998	358	52,015	-	23,659	82,030	2,476 ^a	-	-	-	-	-	-	-	-	-	-	-
1991	4,534	147	52,033	-	39,609	96,323	-	-	-	-	-	- ^a	-	-	-	-	-	-
1992	3,409	229	84,449	6,284	52,547	146,918	-	-	-	-	-	- ^a	-	-	-	-	-	-
1993	5,944	251	26,290	42,061	28,158	102,702	-	-	-	-	-	- ^a	-	-	-	-	-	-
1994	4,400	71	71,019	480,158	12,288	567,936	5,294	819	16,081	31,572	12,732	66,498 ^b	9,694	890	87,100	511,730	25,020	634,434
1995	7,617	78	31,280	37,009	24,843	100,827	5,049	807	13,110	17,246	13,460	49,672 ^b	12,686	885	44,390	54,255	38,303	160,499
1996	3,944	-	52,200	113,837	7,369	177,050	5,324	608	15,963	19,782	16,481	58,157 ^b	8,968	608	68,163	133,619	23,850	235,207
1997	9,067	159	26,079	-	17,139	52,444	6,325	353	9,120	10,804	7,649	34,251 ^b	15,392	512	35,199	10,804	24,788	86,695
1998	6,413	7	24,534	99,412	8,210	136,576	3,903	201	7,303	13,173	2,551	27,191 ^b	10,376	208	31,837	112,585	8,761	163,767
1999	1,927	0	10,264	0	5,700	17,891	2,691	537	8,140	10,067	3,692	25,127 ^b	4,618	537	18,404	10,067	9,392	43,018
5-year avg. ^c	6,228	63	41,022	146,083	13,570	206,967	5,191	558	12,315	18,515	10,575	47,154	11,419	621	53,338	164,599	24,144	254,120
10-year avg. ^d	5,543	152	45,592	77,876	23,265	152,428	-	-	-	-	-	-	-	-	-	-	-	-

^a 1994-1998^b 1989-1998^c Subsistence catches from 1966-72 includes fish taken at St. Michael.^d Subsistence surveys not conducted.^e In-depth survey by Subsistence Division.^f Harvest estimate from Div. of Subsistence survey. Includes harvest in Stebbins and St. Michael.

Appendix Table A8 Commercial and subsistence salmon catches by species, by year for all subdistricts in Norton Sound District, 1961-1999

ALL SUBDISTRICTS																		
Commercial							Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1961	5,300	35	13,807	34,327	48,332	101,801	-	-	-	-	-	-	5,300	35	13,807	34,327	48,332	101,801
1962	7,286	18	9,156	33,187	182,784	232,431	-	-	-	-	-	-	7,286	18	9,156	33,187	182,784	232,431
1963	6,613	71	16,765	55,625	154,789	233,863	5	-	118	16,607	17,635	34,365	6,618	71	16,883	72,232	172,424	268,228
1964	2,018	126	98	13,567	148,862	164,671	565	-	2,567	9,225	12,486	24,843	2,583	126	2,665	22,792	161,348	189,514
1965	1,449	30	2,030	220	36,795	40,524	574	-	4,812	19,131	30,772	55,289	2,023	30	6,842	19,351	67,567	85,814
1966	1,553	14	5,755	12,778	80,245	100,345	269	-	2,210	14,335	21,873	38,687	1,822	14	7,965	27,113	102,118	139,032
1967	1,804	-	2,379	28,879	41,756	74,818	817	-	1,222	17,516	22,724	42,279	2,621	-	3,601	46,395	64,480	117,097
1968	1,045	-	6,885	71,179	45,300	124,409	237	-	2,391	36,912	11,661	51,201	1,282	-	9,276	108,091	56,951	175,610
1969	2,392	-	6,836	86,949	82,795	178,972	436	-	2,191	18,562	15,615	36,804	2,828	-	9,027	105,511	98,410	215,778
1970	1,853	-	4,423	64,908	107,034	178,218	561	-	4,675	26,127	22,763	54,126	2,414	-	9,098	91,035	129,797	232,344
1971	2,593	-	3,127	4,895	131,362	141,977	1,026	197	4,097	10,863	21,618	37,801	3,619	197	7,224	15,758	152,980	179,778
1972	2,938	-	454	45,182	100,920	149,494	804	93	2,319	14,158	13,873	31,247	3,742	-	2,773	59,340	114,793	180,741
1973	1,918	-	9,282	46,499	119,098	176,797	392	-	520	14,770	7,185	22,867	2,310	-	9,802	61,269	126,283	199,664
1974	2,951	-	2,092	148,519	162,267	315,829	420	-	1,064	16,428	3,958	21,868	3,371	-	3,156	164,945	166,225	337,697
1975	2,393	2	4,593	32,388	212,485	251,861	186	11	192	15,803	8,113	24,305	2,579	13	4,785	48,191	220,598	276,166
1976	2,243	11	6,934	87,919	95,956	193,063	203	-	1,004	18,048	7,718	26,973	2,446	11	7,938	105,967	103,674	220,036
1977	4,500	5	3,690	48,675	200,455	257,325	846	-	2,530	14,296	26,607	44,279	5,346	5	6,297	62,971	227,062	301,604
1978	9,819	12	7,335	325,503	189,279	531,948	1,211	-	2,981	35,281	12,257	51,730	11,030	12	10,316	360,784	201,536	583,678
1979	10,706	57	31,438	167,411	140,789	350,401	747	-	8,487	25,247	11,975	46,456	11,453	57	39,925	192,658	152,764	396,857
1980	6,311	40	29,842	227,352	180,792	444,337	1,397	-	8,625	63,778	19,622	93,422	7,708	40	38,467	291,130	200,414	537,759
1981	7,929	56	31,562	232,479	169,708	441,734	2,021	38	13,416	28,741	32,866	77,082	9,950	94	44,978	251,220	202,574	518,818
1982	5,892	10	91,690	230,281	183,335	511,208	1,011	8	14,612	54,249	18,580	88,460	6,903	18	106,302	284,530	201,915	599,668
1983	10,308	27	49,735	76,913	319,437	456,420	-	-	-	-	-	-	-	-	-	-	-	-
1984	8,455	6	67,875	119,381	146,442	342,159	-	-	-	-	-	-	-	-	-	-	-	-
1985	19,491	166	21,968	3,647	134,928	180,200	-	-	-	-	-	-	-	-	-	-	-	-
1986	6,395	233	35,600	41,260	146,912	230,400	-	-	-	-	-	-	-	-	-	-	-	-
1987	7,080	207	24,279	2,260	102,457	136,283	-	-	-	-	-	-	-	-	-	-	-	-
1988	4,096	1,252	37,214	74,604	107,966	225,132	-	-	-	-	-	-	-	-	-	-	-	-
1989	5,707	265	44,091	123	42,625	92,811	-	-	-	-	-	-	-	-	-	-	-	-
1990	8,895	434	56,712	501	65,123	131,665	-	-	-	-	-	-	-	-	-	-	-	-
1991	8,068	203	63,647	-	86,871	156,789	-	-	-	-	-	-	-	-	-	-	-	-
1992	4,541	296	105,418	6,284	83,394	199,933	-	-	-	-	-	-	-	-	-	-	-	-
1993	8,972	279	43,283	157,574	53,562	269,670	-	-	-	-	-	-	-	-	-	-	-	-
1994**	5,285	80	102,140	982,389	18,290	1,108,184	7,374	1,161	22,124	71,066	25,020	126,745	12,659	1,241	124,264	1,053,455	43,310	1,234,929
1995**	8,860	128	47,862	81,644	42,898	181,392	7,766	1,222	23,015	38,594	43,014	113,611	16,626	1,350	70,877	120,238	85,912	295,003
1996**	4,984	1	68,206	487,441	10,609	571,241	7,255	1,182	26,304	64,724	34,585	134,050	12,239	1,183	94,510	552,165	45,194	705,291
1997***	12,573	161	32,284	20	34,103	79,141	8,998	1,892	16,476	27,200	26,803	81,370	21,571	2,053	48,760	27,220	60,906	160,511
1998***	7,429	7	29,623	588,013	16,324	641,396	8,295	1,214	19,007	51,933	20,032	100,480	15,724	1,221	48,630	639,946	38,356	741,878
1999**	2,508	0	12,662	0	7,881	23,051	6,144	1,177	14,342	20,017	19,398	61,078	8,652	1,177	27,004	20,017	27,279	84,129
5-year avg. ^a	7,826	75	56,023	427,901	24,445	516,271	7,938	1,334	21,385	50,703	29,891	111,251	15,764	1,410	77,408	478,605	54,338	627,522
10-year avg. ^b	7,331	185	59,327	230,399	45,380	342,622	-	-	-	-	-	-	-	-	-	-	-	-

* 1994-1998

* 1989-1998

* These figures also include subsistence estimates data from Stetbins and St. Michael.

* Subsistence surveys not conducted.

* Subsistence harvest estimate from Div. of Subsistence survey.

* 1997 Subsistence totals include Savoonga and Gambela.

Appendix Table A9. Mean commercial salmon harvest weights, Norton Sound District, 1964-1999

Year	Mean Round Weight in Pounds ^a			
	Chinook	Coho	Pink	Chum
1964	-	-	-	7.0
1965	-	-	2.3	7.1
1966	-	-	3.5	7.8
1967	23.7	7.0	3.6	7.2
1968	20.0	7.0	4.0	7.5
1969	19.3	7.5	3.6	6.4
1970	20.0	7.0	3.5	7.8
1971	23.7	7.0	3.6	7.2
1972	20.0	7.3	2.8	6.9
1973	20.3	6.8	3.9	7.1
1974	18.2	6.7	3.4	6.6
1975	10.8	7.4	2.9	6.5
1976	15.2	7.2	3.1	7.0
1977	22.7	7.6	3.3	7.0
1978	22.8	6.9	3.6	7.4
1979	22.9	7.1	3.6	7.2
1980	21.5	6.8	3.2	7.2
1981	20.7	6.7	3.5	7.6
1982	16.5	7.1	2.9	7.3
1983	17.4	7.2	3.6	7.4
1984	20.0	7.7	2.9	7.0
1985	21.5	7.7	3.1	7.0
1986	20.8	6.9	3.2	6.9
1987	20.0	7.3	3.0	7.1
1988	16.4	7.5	3.0	7.1
1989	18.4	7.6	3.6	7.0
1990	19.0	7.5	-	7.4
1991	17.7	7.4	-	6.9
1992 ^b	12.7	7.8	2.9	7.1
1993	16.9	6.6	2.6	6.5
1993	18.6	7.5	2.2	6.7
1995	19.7	7.4	2.4	6.7
1996	19.2	8.4	2.4	7.9
1997	17.9	7.3	2.5	7.4
1998	17.2	7.9	2.3	6.5
1999	19.3	6.9	-	7.3

^a Based on age-weight-length samples or fish tickets.

^b Low chinook weight due to utilization of restricted mesh size.

Appendix Table A10. Estimated mean prices paid to commercial salmon fishermen, Norton Sound District, 1962 - 1999.

Year	Chinook	Coho	Pink	Chum
Price Per Fish				
1962	\$3.85	\$0.60	\$0.25	\$0.35
1963	\$3.85	\$0.60	\$0.25	\$0.35
1964	\$4.50	-	\$0.25	\$0.40
1965	\$3.75	\$0.45	-	\$0.40
1966	\$4.80	\$1.05	\$0.25	\$0.65
Price Per Pound				
1967	\$0.20	\$0.14	\$0.07	\$0.09
1968	\$0.25	\$0.14	\$0.06	\$0.10
1969	\$0.22	\$0.14	\$0.06	\$0.11
1970	\$0.25	\$0.14	\$0.06	\$0.10
1971	\$0.25	\$0.14	\$0.07	\$0.10
1972	\$0.27	\$0.16	\$0.06	\$0.11
1973	\$0.40	\$0.16	\$0.07	\$0.32
1974	\$0.40	\$0.16	\$0.13	\$0.32
1975	\$0.40	\$0.16	\$0.13	\$0.24
1976	\$0.50	\$0.32	\$0.17	\$0.30
1977	\$0.65	\$0.40	\$0.16	\$0.30
1978	\$0.65	\$0.35	\$0.20	\$0.30
1979	\$0.88	\$0.66	\$0.16	\$0.41
1980	\$0.74	\$0.63	\$0.07	\$0.23
1981	\$1.25	\$0.62	\$0.13	\$0.26
1982	\$1.25	\$0.57	\$0.12	\$0.32
1983	\$1.13	\$0.39	\$0.11	\$0.28
1984	\$1.20	\$0.45	\$0.11	\$0.24
1985	\$1.08	\$0.48	\$0.20	\$0.31
1986	\$0.88	\$0.52	\$0.15	\$0.27
1987	\$1.11	\$0.57	\$0.20	\$0.33
1988	\$1.26	\$1.13	\$0.19	\$0.39
1989	\$0.73	\$0.43	\$0.10	\$0.18
1990	\$1.01	\$0.50	\$0.75 ^a	\$0.23
1991	^b \$0.87	\$0.36	-	\$0.27
1992	^c \$0.66	\$0.33	\$0.16	\$0.22
1993	^d \$0.72	\$0.22	\$0.15	\$0.24
1994	\$1.02	\$0.52	\$0.15	\$0.29
1995	\$0.66	\$0.43	\$0.18	\$0.18
1996	\$0.54	\$0.28	\$0.10	\$0.08
1997	\$1.00	\$0.47	\$0.06	\$0.11
1998	\$0.74	\$0.29	\$0.14	\$0.09
1999	\$0.82	\$0.35	-	\$0.11

^a Price paid per pound of roe.

^b Price paid for coho and chum roe was \$3.00 per pound.

^c Price paid for coho roe was \$1.50 per pound.

^d Price paid for coho roe was \$1.76 per pound and \$0.40 per pound for sockeye.

Appendix Table A11. Dollar estimates of Norton Sound District commercial salmon fishery, 1961 - 1999.

Year	Gross Value of Catch to Fishermen	Wages Earned ^b	License and Tax Revenues to State (License Fees Only)
1961	^a	^a	\$2,010.00
1962	\$105,800.00	^a	\$16,341.00
1963	\$104,000.00	^a	\$18,009.00
1964	\$51,000.00	^a	\$11,305.00
1965	\$21,483.00	^a	\$5,084.00
1966	\$68,000.00	^a	\$4,680.00
1967	\$44,038.00	\$58,000.00	\$3,500.00
1968	\$63,700.00	^a	\$4,000.00
1969	\$95,297.00	\$72,145.00	^a
1970	\$99,019.00	\$55,100.00	\$5,595.00
1971	\$101,000.00	\$65,500.00	\$5,730.00
1972	\$102,225.00	\$68,700.00	\$7,000.00
1973	\$308,740.00	\$81,000.00	\$15,400.00
1974	\$437,127.00	\$129,600.00	\$20,028.00
1975	\$413,255.00	\$172,800.00	\$28,230.00
1976	\$285,283.00	^a	\$10,133.00
1977	\$528,610.00	^a	\$11,386.00
1978	\$814,221.00	^a	\$12,002.00
1979	\$876,547.00	^a	\$11,780.00
1980	\$583,388.00	^a	\$11,640.00 ^c
1981	\$758,471.00	^a	\$11,940.00
1982	\$988,588.00	^a	\$7,155.00 ^{c,d}
1983	\$1,038,967.00	^a	\$10,700.00 ^c
1984	\$721,055.00	^a	\$9,690.00 ^c
1985	\$822,056.00	^a	\$5,820.00 ^e
1986	\$539,576.00	^a	\$5,970.00 ^e
1987	\$504,631.00	^a	\$5,940.00 ^e
1988	\$754,751.00	^a	\$10,050.00 ^{e,f}
1989	\$274,817.00	^a	\$10,300.00 ^e
1990	\$497,623.00	^a	\$10,350.00 ^e
1991	\$425,430.00	^a	\$10,250.00 ^e
1992	\$448,395.00	^a	\$10,200.00 ^e
1993	\$322,117.00	^a	\$8,835.00 ^e
1994	\$864,882.00	^a	\$10,000.00 ^e
1995	\$356,912.00	^a	\$5,250.00 ^e
1996	\$340,347.00	^a	\$4,300.00 ^e
1997	\$363,907.48	^a	\$5,100.00 ^e
1998	\$358,982.00	^a	\$4,100.00 ^e
1999	\$76,860.00	^a	\$3,000.00 ^e

^a Information not available.^b Includes wages paid to tender boat operators, processing plant employees in district.^c Includes only permit renewals and vessel license fees.^d The Alaska state legislature lowered all resident permit renewal fees and vessel license fees to poverty level fees for 1982.^e Includes only permit renewal fees.^f The Alaska state legislature raised resident permit renewal fee to \$50.00 in 1988.

Appendix Table A12. Round weight of commercially caught salmon by species, Norton Sound District, 1961 - 1999.

Year	Pounds Caught (Round Wt. in Lbs)				Salmon
	Chinook	Coho	Pink	Chum	Roe (lbs)
1961	120,405	96,649	102,711	347,990	
1962 ^a	157,000	-	10,569	221,645	
1963 ^a	89,700	51,750	-	-	
1964 ^a	39,169	686	-	249,890	
1965	33,327	14,210	660	264,924	^b
1966	35,259	40,285	38,334	577,764	16,901
1967	41,854	15,944	100,913	289,473	21,429
1968 ^c	22,954	50,665	250,044	306,871	20,381
1969 ^d	51,441	50,461	312,836	529,235	5,578
1970	38,103	25,000	156,313	610,588	1,345
1971	43,112	22,078	15,377	857,014	1,122
1972	57,675	3,257	133,389	710,853	1,083
1973	38,935	63,812	185,799	845,596	^b
1974	54,433	15,023	511,737	1,082,575	39,876
1975	25,964	32,345	87,586	1,318,111	46,470
1976	34,095	49,822	271,867	669,728	^b
1977	102,341	28,044	162,457	1,415,981	^b
1978	222,974	50,872	1,164,174	1,389,806	^b
1979	231,988	251,129	598,785	1,001,548	^b
1980	135,646	204,498	719,368	1,301,693	^b
1981	164,182	212,065	719,102	1,284,193	^b
1982	97,255	648,212	659,171	1,338,788	95
1983	179,666	360,264	274,568	2,352,104	239
1984	169,104	523,310	343,685	1,020,635	0
1985	419,331	169,413	11,458	939,885	0
1986	133,161	247,333	133,319	1,011,824	0
1987	141,494	177,569	6,691	731,597	0
1988	67,148	280,658	226,966	767,168	0
1989	104,829	336,652	439	297,156	0
1990	168,745	426,902	-	482,060	75
1991	107,541	469,495	-	597,272	221
1992	57,571	820,406	18,230	595,345	2,641
1993	151,504	287,702	406,820	347,072	2,608
1994	98,492	102,140	2,185,066	122,540	0
1995	174,771	356,190	198,121	290,445	0
1996	95,794	573,372	1,196,115	84,349	0
1997	225,136	235,517	50	253,006	880
1998	127,831	232,705	1,330,624	106,687	0
1999	48,421	88,037	0	57,656	0

^a Does not include canned salmon cases (48#)

1962: 29 chinook, 883 coho, 927 pink, 12459 chum

1963: 604 chinook, 808 coho, 1,918 pink, 13,308 chum

1964: 75 chinook, 452 pink, 9,357 chum

^b Information not available.

^c Includes about 48,000 lbs of salted coho, about 150,000 lbs. of salted pink, and 150,000 lbs of salted chum.

^d Includes about 598 lbs. of salted chinook, about 48,092 lbs. of salted pink and about 117,664 lbs. salted chum.

Appendix Table A13. Comparative salmon escapement indexes of Norton Sound streams, 1961-1999.*

Year	Stuk River					Nome River					Flambeau River				
	Chinook	Chum	Pink	Pink & Chum ^b	Coho	Chinook	Chum	Pink	Pink & Chum ^b	Coho	Chinook	Chum	Pink	Pink & Chum ^b	Coho
1961															
1962															
1963															
1964															
1965															
1966															
1967															
1968															
1969															
1970															
1971						-	75	7,765	-	-					
1972						-	710	14,960	-	-					
1973						6	1,760	14,940	-	-					
1974						-	854	17,832	-	-					
1975	-	4,662	5,390	-	-	1	2,161	3,405	-	-					
1976											-	375	1,994	-	-
1977	-	5,207	1,302	-	-	5	3,046	1,726	-	-	-	1,275	10	-	-
1978	-	8,756	22,435	-	-	2	5,242	34,900	-	-	-	7,110	-	-	-
1979											-	283	291	-	-
1980	3	2,022	199,000	-	1,002	5	-	-	179,095	920	-	-	-	29,190	-
1981	-	5,579	350	-	-	15	1,195	12,565	-	-	1	12,031	2,710	-	-
1982	-	638	148,800	-	-	-	700	327,570	-	-	1	5,097	25,001	-	-
1983	48	2,150	10,770	-	96	2	198	9,170	-	365	2	1,195	200	-	-
1984	7 ^k	493 ^k	284,400 ^k	-	192	-	2,084 ^k	178,870	-	839	1	3,150 ^k	20,200 ^k	-	-
1985	4	1,910	8,860	-	33	7	1,967	2,250	-	242	1	3,215	260	-	-
1986	4	1,960	28,690	-	-	2	1,150	13,580	-	-	2	3,075	300	-	-
1987	5	4,540	30	-	230	3	1,646	1,400 ^k	-	419	0	115	0	-	-
1988	3	2,070	4,652 ^l	-	563	3	973	2,490 ^l	-	1,280 ^k	3	765	10	-	-
1989	-	1,025	26,850	-	75	2	72	1,365	-	375	-	-	-	-	-
1990	-	95	29,040	-	161	-	541	13,085	-	617	-	-	-	-	-
1991	3	5,420	14,680	-	701	9	3,520	4,690	-	611	2	1,564	570	-	-
1992	-	470	292,400	-	422	3	813	255,700	-	691	-	606	180	-	-
1993	7	1,570	5,120	-	104	8	1,520	8,941	-	276 ^d	-	1,590	-	-	-
1994	10	1,140	492,000	-	307	2	350	265,450	-	631 ^d	1	4,960	290	-	-
1995	-	3,110	1,250	-	290	-	1,855	182	-	517	-	6,455	350	-	68
1996	5	1,815	74,100	-	367	-	799	34,520	-	723	-	5,390	-	-	-
1997	-	2,975	1,200	-	57	4	956	65	-	544	1	627	-	-	96
1998	-	630	372,850	-	322	3	335	179,680	-	515	1	2,828	7180	-	-
1999	-	1,697	180	-	217	-	375	345	-	620	-	55	-	-	-

* Represents "high count" for season.

^b Surveyor unable to distinguish between the two species.^c Poor survey conditions or partial survey, poor counting tower conditions.^d Total counts obtained from counting tower.^e Combined tower and aerial survey counts below the tower.^f Aerial survey; not tower count.^g Helicopter survey.^h Boat survey.ⁱ Foot survey.^j Includes counts from Casadepaga and Ophir Creeks.^k Includes counts from Ophir Creek.^l Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

Year	Eldorado					Fish River					Boston Creek				
	Chinook	Chum	Pink	Pink & Chum ^b	Coho	Chinook	Chum	Pink	Pink & Chum ^b	Coho	Chinook	Chum	Pink	Pink & Chum ^b	Coho
1961						1	-	-	14,100	-					
1962						48	-	-	28,918	-					
1963						21	-	-	25,728	-	67	1,669	-	-	-
1964						-	18,670	10,935	14,550	-	10	3,315	-	-	-
1965															
1966						7	-	-	17,955	-	153	761	-	-	-
1967						20	-	-	13,610	-					
1968						10	-	-	164,000	-	7	2,500	2,500	-	-
1969						-	2,080	124,000	-	-	100	7,000	16,000	-	-
1970						33	76,550	198,000	-	-	246	8,200	12,900	-	-
1971						1	13,185	1,670	-	-	42	7,045	80	-	-
1972						-	3,616	13,050	-	-	57	4,252	3,950	-	-
1973						31	6,887	15,564	-	-	153	3,014	3,213	-	-
1974	13	2,143	6,185	-	-	7	10,945	15,090	-	-	231	2,426	749	-	-
1975						26	20,114	15,840	-	-	147	1,885	2,556	-	-
1976						1	8,390	15,850	8,550	-					
1977	-	1,835	125	-	-	9	9,664	2,430	-	-	76	1,325	385	-	-
1978	-	10,125	12,800	-	-	29	26,797	140,640	-	-	136	2,655	74,221	-	-
1979						11	6,893	9,132	-	-	58	882	271	-	-
1980	6	9,900	55,520	-	-	-	19,100	33,500	-	-	16	2,450	1,510	-	-
1981	-	15,605	495	-	-	90	24,095	450	-	-					
1982	2	1,095	163,300	-	-	-	-	-	241,700	-	10	1,730	22,020	-	-
1983	11	994	270	-	100	87	20,037	300	-	-	154	704	-	-	-
1984	14 ^c	4,361 ^d	1,924,935 ^e	-	261	42	-	-	293,245	-	35	-	-	47,850	-
1985	8	6,090	150	-	67	303	21,080	7,365	-	-	243	3,450	-	-	-
1986	9	3,490	18,200	-	-	200	25,190	140	-	-	2	220	0	-	-
1987	6	3,860	0	-	108	193	7,886	0	-	-	583	3,640	0	-	-
1988	17	2,645	1,045	-	78	36	1,240	29,950 ^f	-	-	163	1,040	7,400 ^g	-	-
1989	-	350	1,550	-	87										
1990	17	884	2,050	-	44							1,455	8,440	-	-
1991	76	5,755	1,590	-	98	58	10,190	51,190	-	-	152	2,550	3,210	-	-
1992	-	4,887	6,615	-	113	4	390	1,387,000	-	-	68	1,540	803,200	-	-
1993	38	2,885	120	-	110	48	12,695	13,440	-	-	227	4,513	1,930	-	-
1994	2	5,140	53,890	-	242	55	16,500	910,000	-	-	95	4,270	355,600	-	-
1995	-	9,025	50	-	247	40	13,433	780	-	1,829	78	4,221	-	-	230
1996	21	23,820	40,100	-	254	189	5,840 ^h	684,780	-	-	133	3,505 ⁱ	35,980	-	-
1997	40	5,967	10	-	37	110	19,515	800	-	465	452	4,545	-	-	-
1998	8	3,000	123,950	-	71	96	28,010	663,050	-	-	255	418	175,330	-	-
1999	-	1,741	6	-	45	-	50	20	-	821	-	-	-	-	319

^a Represents "high count" for season.^b Surveyor unable to distinguish between the two species.^c Poor survey conditions or partial survey, poor counting tower conditions.^d Total counts obtained from counting tower.^e Combined tower and aerial survey counts below the tower.^f Aerial survey, not tower count.^g Helicopter survey.^h Boat survey.ⁱ Foot survey.^j Includes counts from Casadepaga and Ophir Creeks.^k Includes counts from Ophir Creek.^l Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

Year	Niukluk River					Kwiniuk River					Tubutuluk River				
	Chinook	Chum	Pink	Pink & Chum ^a	Coho	Chinook	Chum	Pink	Pink & Chum ^a	Coho	Chinook	Chum	Pink	Pink & Chum ^a	Coho
1961															
1962	11	-	-	27,879	-	3	-	-	23,249	-	3	-	-	16,690	-
1963	1	13,687	4,103	-	-	2	11,340	3,779	-	-	9	16,069	4,355	-	-
1964	-	8,395	10,495	-	-	-	14,533	-	-	-	-	15,469	10,043	3,420	-
1965	-	-	-	-	-	14	26,634	8,301	-	-	-	-	-	-	-
1966	-	21,300	8,600	4,700	-	7	32,786	10,629	-	-	-	5,514	26,000	-	-
1967	-	20,546	-	-	-	13	24,444	3,508	-	-	1	-	-	22,475	-
1968	-	-	-	87,085	-	27	18,813	126,764	-	-	-	-	-	-	-
1969	-	10,240	92,650	-	-	12	19,687	56,683	-	-	3	12,040	12,788	3,045	-
1970	-	7,300	60,350	-	-	-	68,004	235,131	-	-	-	53,290	136,590	-	-
1971	-	22,605	8,370	-	-	37	39,046	16,742	-	-	-	16,820	7,500	5,065	-
1972	-	10,500	22,600	-	-	65	30,686	62,461	-	-	-	8,070	21,100	-	-
1973	-	14,365	14,790	-	-	57	28,617	38,420	-	-	131	5,383	15,665	-	-
1974	1	8,720	8,915	-	-	62	35,899	40,816	-	-	136	9,560	17,940	-	-
1975	-	10,089	16,258	-	-	44	14,344	57,317	-	-	7	17,141	38,003	-	-
1976	-	4,130	7,190	-	-	12	6,977	29,471	-	-	-	1,095	6,095	2,600	-
1977	19	10,456	4,150	-	-	84	22,757	46,234	-	-	-	8,540	4,685	-	-
1978	2	14,365	208,300	-	-	74	14,408	72,270	-	-	2	5,865	1,364	-	-
1979	8	10,127	30,147	-	-	107	12,355	167,492	-	-	-	812	1,624	-	-
1980	-	8,915	75,770	-	-	177	19,374	320,389	-	-	405	21,616	663,937	-	-
1981	-	7,249	-	-	-	136	34,561	566,417	-	-	-	-	-	-	-
1982	20	2,557	227,540	-	-	138	44,036	469,674	-	-	49	2,044	53,605	-	-
1983	54	8,886	50	-	-	267	56,907	251,965	-	-	135	16,345	40,790	-	-
1984	6	-	-	57,208	3,072	736	54,043	736,544	-	983	139	56,210	93,600	-	-
1985	25	11,140	-	-	332	712	9,912	22,548	-	673	472	13,645	8,940	-	-
1986	2	2,442	0	-	-	653	24,704	241,446	-	421	453	5,975	35,680	-	-
1987	10	4,145	0	-	257	314	16,134	5,567	-	819	474	9,605	580	-	-
1988	18	6,501	8,160	-	1,095	321	13,301	187,904	-	444	561	4,660	114,450	-	-
1989	-	-	-	-	182	282	13,689	30,275	-	-	-	-	-	-	-
1990	-	6,200	-	-	170	744	13,735	404,452	-	746	397	4,350	186,400	-	-
1991	24	10,640	37,410	-	1,783	587	18,802	54,591	-	809	661	7,085	26,870	-	-
1992	-	7,770	803,200	-	812	479	12,077	1,464,717	-	532	260	2,595	138,600	-	-
1993	15	19,910	2,840	-	2,104	565	15,823	43,065	-	1,238	1,061	8,740	18,650	-	1,395
1994	7	16,470	1,294,100	-	274	627	33,010	2,303,112	-	2,841	No survey due to poor conditions				
1995	48	25,358	200	-	2,136	468	42,161	17,573	-	1,625	377	16,158	4,020	-	930
1996	25	9,732	153,150	-	2,047	567	27,256	937,735	-	1,410	439	10,790	226,750	-	-
1997	131	16,550	-	-	983	972	20,118	9,536	-	610	1,946	3,105	16,890	-	-
1998	51	2,556	205,110	-	593	296	24,248	655,933	-	610	894	10,180	112,480	-	-
1999	-	640	-	-	619	114	8,342	466	-	223	-	-	-	-	-

^a Represents "high count" for season.^b Surveyor unable to distinguish between the two species.^c Poor survey conditions or partial survey, poor counting tower conditions.^d Total counts obtained from counting tower.^e Combined tower and aerial survey counts below the tower.^f Aerial survey; not tower count.^g Helicopter survey.^h Boat survey.ⁱ Foot survey.^j Includes counts from Casadepaga and Ophir Creeks.^k Includes counts from Ophir Creek.^l Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

Year	North River				
	Chinook	Chum	Pink	Pink & Chum ^b	Coho
1961					
1962	162	-	-	16,087	-
1963	287	-	-	73,274	-
1964	23	-	-	5,981	-
1965	153	-	-	16,600	-
1966					
1967					
1968					
1969					
1970	1	20,655	12,400	-	-
1971	256	-	-	1,047	-
1972	561	2,332	54,934	-	-
1973	298	4,332	26,542	-	-
1974	220	861	154,285	-	-
1975	60	5,237	17,885	-	-
1976	66	196	10,606	-	-
1977	1,275	8,139	4,565	-	-
1978	321	9,349	21,813	-	-
1979	735	1,130	9,500	-	-
1980	61	2,300	127,900	-	204
1981	68	405	575	-	263
1982	8	599	173,352	-	4,145
1983	347	4,135	4,980	-	-
1984	2,844	2,915	458,387	-	152 ^d
1985	1,426	4,567	4,360	-	2,045
1986	1,613	3,738	236,487	-	-
1987	445	392	0	-	680
1988	202	30	112,770 ^f	-	240
1989	-	-	-	-	-
1990	255	510	25,685	-	-
1991	656	2,435	118,720	-	2,510
1992	329	-	631,140	-	398
1993	900	445	13,570	-	1,397
1994	No survey due to poor conditions				
1995	622	1,370	18,300	-	690 ^e
1996	106	220 ^g	125,500	-	917
1997	1,605	9,045	17,870	-	-
1998	591	50	153,150	-	233
1999	18	1,480	3,790	-	533

* Represents "high count" for season.

^b Surveyor unable to distinguish between the two species.^c Poor survey conditions or partial survey, poor counting tower conditions.^d Total counts obtained from counting tower.^e Combined tower and aerial survey counts below the tower.^f Aerial survey; not tower count.^g Helicopter survey.^h Boat survey.ⁱ Foot survey.^j Includes counts from Casadeaga and Ophir Creeks.^k Includes counts from Ophir Creek.^l Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

PORT CLARENCE DISTRICT

District Boundaries

The Port Clarence District encompasses all waters from Cape Douglas north to Cape Prince of Wales including the Salmon Lake and Pilgrim River drainage (Figure 2). Salmon, saffron cod, whitefish and herring are the major subsistence species; however, other fishery resources are also utilized.

Commercial Fishery

Commercial salmon fishing in this district has been prohibited since 1967. In 1966 a total of 1,216 salmon consisting of 93 sockeye, 131 pinks and 922 chums was taken commercially in the Grantley Harbor/Tuksuk Channel area. A few subsistence caught salmon are sold or bartered each year in Teller and Nome. Due to the relatively small runs in this area and the existence of a subsistence fishery, commercial salmon fishing has not been reopened.

Subsistence Fishery

A traditional subsistence salmon fishery has probably occurred within this district for centuries; however, subsistence fishing has only been reported at Salmon Lake since the 1930's and monitored at the upper Pilgrim River since 1962. Data collected by Department personnel has indicated a majority of the fishermen of Brevig Mission fish the northern and northeastern sections of Port Clarence, while Teller fishermen utilize Grantley Harbor and Tuksuk Channel. Interviews with local residents have also indicated substantial fishing effort within the Agiapuk River. Village subsistence surveys had been conducted annually by the Division of Commercial Fisheries up until 1983 (Appendix Table B1). Subsistence Division conducted a partial survey of Brevig Mission in 1989. The department has conducted full-scale household surveys of both villages since 1994.

Salmon Lake and Pilgrim River stocks have been utilized by Nome residents in addition to those of Brevig Mission and Teller. The Alaska Board of Fisheries adopted a regulation in 1972 that closed Salmon Lake and tributaries to subsistence salmon fishing from July 15 through August 31 to conserve declining sockeye salmon stocks. Subsistence salmon fishing permits are required for the Pilgrim and Kuzitrin Rivers. Beginning in the 1991 season, an increase was observed in the number of subsistence permits issued to Nome residents intending to fish in the area. This was due in part to a strong sockeye salmon return. Another reason was the extensive subsistence fishing closures in the Nome area that made the Pilgrim River an alternative location to obtain their subsistence needs. In 1999, 35 households requested permits for this area (Table 2). Some subsistence salmon fishing by Nome residents in the Port Clarence District may not be documented by household surveys or permit data. Permits are required only on the Pilgrim River.

The 1999 estimated subsistence salmon harvest in Port Clarence District was 6,233 fish. This was less than one-half of the 1998 harvest, and the lowest harvest documented in the six years of this survey project. Of the total harvest, 1% were chinook, 31% were chum salmon, 13% were pink, 38% were sockeye, and 17% were coho. A summary of the subsistence salmon harvest estimates by community is presented in Table 8.

The estimated mean harvest in the Port Clarence District was 35 salmon per household, which included 0.5 chinook, 11 chum, 4 pink, 14 sockeye, and 6 coho. Brevig Mission had a mean household harvest of 45 fish and Teller had a mean household harvest of 38 fish. Households with Pilgrim River permits harvested a mean of 15 fish per household.

In the Port Clarence District, 42% of households subsistence fished for salmon in 1999. About 12% helped other households process subsistence-caught fish. Two percent of subsistence caught salmon were reported to be used for dog food. Set gillnets were used by 94% of the households to harvest salmon, while rod and reel was used by 4%, and seine nets used by 6%. Approximately 57% of the fishing households responded that their chum fishing season was "poor" and 36 percent said "average". About 7% said the chum fishing season was "very good". A larger percentage of households responded "poor" in 1999 than in the previous three years (Georgette and Utermohle, 2000).

Escapement

Aerial surveys are not typically flown in this district, with the exception of Salmon Lake, because of the higher priority assigned to the Nome area and more intensive commercial fisheries in the Norton Sound District. Aerial surveys show an increasing trend of sockeye returns to Salmon Lake since 1986 (Appendix Table B2). The 1999 aerial survey count was 33,5000 red salmon. Recent year counts are in the upper end of the range and reflect an increasing population of red salmon.

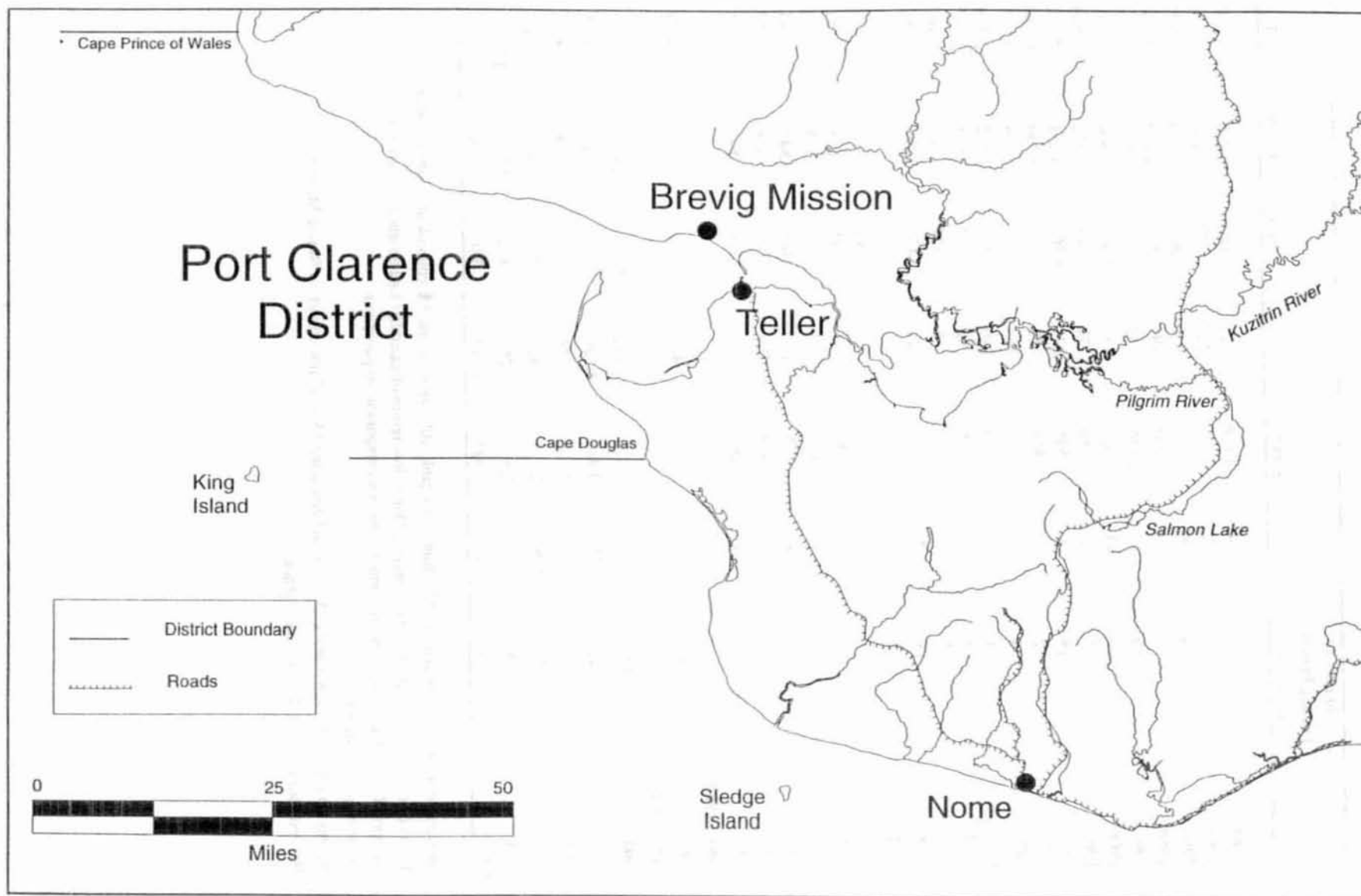
Table 8. Subsistence salmon harvests Port Clarence District, 1999.

			Chinook		Chum		Pink		Sockeye		Coho		Total	
	Total HH's	HH's Contacted	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total
Brevig Mission	70	63	32	38	653	748	571	666	788	919	660	774	2,704	3,144
Pilgrim R. Permits ^b	35	22	28	28	91	91	0	0	180	180	20	20	319	319
Teller	72	70	23	24	1,059	1,097	116	120	1,246	1,293	227	236	2,671	2,770
PORT CLARENCE	177	155	83	89	1,803	1,936	687	786	2,214	2,392	907	1,030	5,694	6,233

^a Data from contacted households were expanded to households not contacted. If less than 30 and less than 50% of households in a community were contacted, then reported harvest is used for estimated harvest. SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1999.

^b Alaska Department of Fish and Game, Division of Commercial Fisheries, permit returns, 1999. Data not expanded.

Figure 2. Port Clarence Salmon District



Appendix Table B1. Subsistence surveys conducted in Port Clarence District 1963 - 1999.

Year	Number of Fishing Families Interviewed	Chinook	Sockeye	Coho	Pink	Chum	Total
1963	19	9	4,866	25	1,061	1,279	7,240
1964	22	17	1,475	227	371	1,049	3,139
1965	29	36	1,804	639	1,854	1,602	5,935
1966	26	10	1,000	896	859	2,875	5,640
1967	19	12	2,068	232	767	1,073	4,152
1968	24	40	688	133	1,906	904	3,671
1969	13	2	180	27	548	932	1,689
1970	18	4	588	1,071	1,308	4,231	7,202
1971	22	31	850	959	1,171	3,769	6,780
1972	8	4	68	388	75	2,806	3,341
1973	4	22	46	280	424	1,562	2,334
1974	13	-	28	62	14	2,663	2,767
1975	17	-	244	5	743	1,589	2,581
1976	15	7	291	20	436	6,026	6,780
1977	^a 13	-	-	-	-	-	5,910
1978	26	1	392	-	7,783	705	8,881
1979	26	-	320	35	741	1,658	2,754
1980	22	7	3,195	5	3,170	1,715	8,092
1981	10	8	255	110	765	5,845	6,983
1982	27	23	405	100	4,345	684	5,557
1983	^b 3	17	261	-	615	299	1,192
1984 - 1988	^c						
1989	^d 15	28	535	472	395	410	1,840
1990 - 1993	^e						
1994	^e 127	181	1,979	1,692	3,849	2,042	9,743
1995	^e 122	76	4,481	1,739	3,293	6,011	15,600
1996	^e 117	195	4,558	2,079	2,587	1,264	10,684
1997	^e 126	158	3,177	829	755	2,099	7,019
1998	^e 138	287	1,665	1,759	7,812	2,621	14,144
1999	^e 155	89	2,392	1,030	786	1,936	6,233

^a Species composition estimated at 75% chum, 10% pink, 10% sockeye and 5% chinook and coho combined.

^b Data collected from returned catch calendars. Due to low return of calendars and absence of household surveys, the resultant catches are incomplete and not comparable to past years.

^c Surveys not conducted.

^d Survey conducted by Subsistence Division and contacted 15 of 43 households in Brevig Mission.

^e Harvest estimate from Div. of Subsistence survey.

Appendix Table B2.

Comparative sockeye salmon aerial survey
indicies, Port Clarence District, 1963 -1999.

Year	Salmon	Grand Central	Total
	Lake	River	
1963	866	620	1,486
1964 ^c	76	590	666
1965	250	160	410
1966	1,120	370	1,490
1967	129	280	409
1968 ^c	830	645	1,475
1969	24	171	195
1970 ^a	-	-	-
1971	538	512	1,050
1972 ^c	680	300 ^b	980
1973	1,747	607	2,354
1974	820	-	820
1975	537	123	660
1976	132	22	154
1977	317	235	552
1978	822	280	1,102
1979	1,250	261	1,511
1980 ^c	512	175	687
1983	970	-	970
1984	445	30	475
1985	730	250	980
1986	2,125	160	2,285
1987	4,040	530	4,570
1988	1,195	6	1,201
1989	3,055	525	3,591
1990	2,834	926	3,760
1991	3,790	1,570	5,360
1992	1,500	^a	1,500
1993	2,885	216	3,092
1994	3,740	1,230	4,970
1995	5,433	628 ^d	6,061
1996	6,610	770	7,380
1997	8,760	1,520	10,280
1998	5,210	1,977	7,187
1999	31,720	1,780	33,500

^a No survey made.^b Boat survey.^c Poor survey.^d Early count.

KOTZEBUE SOUND DISTRICT

History

The Kotzebue Sound District supports the northernmost commercial salmon fishery in Alaska (Figure 3). The Kotzebue District is divided into three subdistricts. Subdistrict 1 has six statistical areas where the commercial salmon fishing occurs (Figure 4).

The recent commercial fishery opened under state management in 1962. Salmon harvests consist primarily of chum salmon although limited amounts of Dolly Varden and a few chinook salmon are harvested as well during the salmon fishery. There are 215 commercial permit holders, of which an average of 146 were active over the ten year period 1986 to 1995. During the recent four years, participation in the fishery has averaged 57 permit holders. Eighty-seven percent of the permittees are residents of the district and 99 percent are residents of the state.

The earliest documented sales of salmon in the Kotzebue District were in 1909 when Lockhart's store purchased 21,906 pounds of salmon from local Native Alaskans and resold it at \$0.05/lb. Of that, 21,366 pounds were sold to gold miners on the Kobuk River drainage and 540 pounds were sold to a company in Seattle. A commercial fishery occurred from 1914 to 1918. Salmon were canned and the bulk of the harvest was thought to have been sold to miners working in the upper Kobuk River drainage. The next organized commercial fishery began under state management in 1962 and continues to the present. The current fishery became fully developed in the mid-1970s. The fishery displayed a gradually declining pattern of overall run strength with four year cycles of stronger returns followed by weaker returns. In 1987, the fisheries managers began a rebuilding program with an emphasis on attaining escapement goals. Prior to 1987, harvest had been proportional to total return. Since 1995, poor market conditions have caused harvests to fall short of their potential, particularly in 1995 and 1996 when resulting escapements were very strong.

In 1981, a chum salmon hatchery was established at Sikasuilaq Springs, a tributary of the Noatak River. The hatchery was closed in 1995 due to lack of funding support. At peak production, the hatchery incubated 11,100,000 eggs in 1992. An estimated peak production adult hatchery return of 90,000 chum salmon occurred in 1997. The estimated contribution to the commercial fishery was approximately 50%.

General Information

The commercial harvest in the Kotzebue District in 1999 was 138,605 chum salmon, 5 chinook salmon, and 1,502 Dolly Varden. The chum salmon harvest was limited by the buyers shipping capacity, which resulted in a commercial catch below the pre-season projected harvestable surplus of 150,000 to 250,000. Only 60 of a possible 203 permit

holders fished during the season with the greatest number participating in any one period being 36. This was up slightly from last year when only 45 permit-holders participated.

The Kotzebue Sound salmon fishery is a set gill-net only fishery with each permit holder limited to 150 fathoms in aggregate length. Most fishermen operate their gear as a single unit tied to the beach and anchored offshore. The mesh size of choice was 5- 7/8 or 6 inch stretched measurement. The only buyer present requested that openings be 12 hours in duration and end at 6:00 pm to coincide with airline schedules. There were a total of 30 openings between July 12 and when the buyer ceased operations on August 27. Total fishing time was 312 hours or 58% of the 540 hour long term average (Table 1).

Chum salmon were assumed to average 8 lbs. and were not weighed. The buyer had used this weight during the last several years based on long term historic average weights of chum salmon in the fishery. An estimated 1,108,898 lbs. of chum salmon were purchased at \$.16 per pound. Eighty-seven pounds (average weight 17.4) of Chinook salmon were purchased at \$1.00 per pound and 11,352 pounds (average weight 7.6) of Dolly Varden were purchased at \$.20 per pound (Table 2). The total ex-vessel value of the fishery was \$179,781. This was an average \$2,996 per participating permit holder. The fish were packed whole in ice and flown to Anchorage or Bethel for processing.

1999 Commercial Season Summary

Inseason Management

The management objectives for the Kotzebue District are to provide adequate chum salmon escapement through the commercial fishery to sustain the run and to provide for the subsistence needs of local users. Due to a lack of resources the only information available on which to base management decisions were the commercial fishery catch rates and the results of a test fishery conducted on the Kobuk River near Kiana.

The commercial catch rates (catch per unit effort) in relation to historical averages were used as an indication of the total run strength. Short frequent openings and a low number of participants distributed in an atypical manner complicated this situation. In order to compare the 1999 catch and effort data with that of previous years, information from the 12-hour periods needed to be combined. Monday through Wednesday was considered as one period and Thursday and Friday to be another, for comparison as the historical two openings a week (Table 3).

A test fishery conducted on the Kobuk River for the seventh year provided the only in-season escapement information. Poor weather did not allow aerial surveys during the commercial fishery.

Scale samples were collected from the catch to determine the age composition. This provides an indication of the stage of the run, as older age groups tend to dominate the early portion of the run, being replaced by the younger age classes as the run progresses.

Season Narrative

The season was opened on July 12 by emergency order with 12-hour openings from 6 am till 6 PM on Monday, Tuesday, Thursday, and Friday. During the first opening nobody participated and participation was limited to a maximum of four through July 20th. As expected the five and six year classes that make up the majority of the early part of the run were in very low abundance. The Kobuk River test fish CPUE was very low indicating poor escapement and the fishery was not opened again until July 28th. Test fishing conducted during the closure indicated average run strength by July 26th.

At the peak of the season, between July 30 and August 11, the buyer only had the shipping capacity to buy every other day. On August 16, the buyer requested that the openings be increased to five days per week. As the catch per fisherman was above the historical average and the maximum number of fishermen participating to that date was a low number (36), the requested change was implemented (Figure 1). Five days per week fishing continued until August 27 when buying operations ceased. The catch per effort relative to the historical average was high and test fish catches on the Kobuk River were the second highest since the project began in 1993. This indicated that the run was stronger than average and that the potential harvest may not have been realized (Table 4).

The age structure of the commercial catch was much different than the historic average, being dominated by four-year-olds throughout the season (Table 5, Figure 2). The age structure accounts for the weak early return and the typical four-year-old peak.

Subsistence Season Summary

In the Kotzebue Sound District, household surveys were conducted in the Noatak and Kobuk River villages of Noatak, Noorvik, Kiana, Ambler, Shungnak, and Kobuk. In 1999, a total of 45% of households in these communities were surveyed about their subsistence salmon catches. Kotzebue has a population of approximately 3,000 people, and was too large to survey house-to-house in an effective and timely way. Therefore the department assessed subsistence salmon harvests in Kotzebue through a mail-out postcard survey. The post card survey is an abbreviated version of the household survey instrument. It asked if households harvested salmon for subsistence use, the quantities harvested, and type of fishing gear used. About 26% of the households receiving the postcard responded. An undetermined number of households were missed by the postcard survey, especially those who have recently moved to Kotzebue (Georgette and Utermohle, 2000).

The subsistence salmon harvest in the Kotzebue District in 1999 was 97,004 fish (Table 13). Chum salmon made up 97% of the catch with the remaining portion a mix of other salmon species, which are present in only small numbers in the district. The 1999 subsistence salmon harvest was about 59-85% higher than the 1997 and 1998 harvest (Georgette and Utermohle, 2000).

The estimated mean salmon harvest was about 76 salmon per household. This included 74 chum, 1 pink, and 1 coho. Noorvik had the highest mean household harvest of 151 salmon. The mean household harvests in the other communities were Noatak with 116 salmon,

Kotzebue and Kobuk each with 81 salmon, Shungnak with 76 salmon, Kiana with 42 salmon and Ambler with 33 salmon.

In the Kotzebue District, 58% of households subsistence fished for salmon in 1999 and about 2% assisted other households in processing subsistence-caught salmon. 14% of the subsistence harvest was used for dog food (excluding Kotzebue). Set gillnets were used by 69% of households for harvesting salmon, while 36% of households used rod and reel, and 7% used a seine. Less than 2% of the salmon catch was caught by rod and reel (excluding Kotzebue).

In the Kotzebue District, 11% of the fishing households responded that their chum salmon fishing season was "poor," 48% said "average," and 42% said "very good" (Georgette and Utermohle, 2000).

Escapement

A test fish project located just downstream from the village of Kiana monitored escapement into the Kobuk River. The test fish index of 1,357 was the second highest in the seven years the project has been in operation (Table 12). This is graphically presented in Figure 3. The 1996 test fishery index is not shown, as the index was almost twice that of any other year of the project. The index in the lowest year, 1993, was 494. Aerial surveys indicated that escapement was adequate in 1993. Due to lack of staff, no aerial surveys were conducted on the Noatak River in 1999.

Aerial surveys were conducted on the Tutuksuk, Salmon, and Squirrel Rivers on August 18 under relatively good conditions. Counts were 2,906, 4,989, and 13,513 chum salmon, respectively (Appendix Table C8). It was felt that the survey was well before the peak as very few fish were spawning and no carcasses were observed. Escapements were judged to be within the Biological Escapement Goal (BEG) ranges.

The upper Kobuk River was flown on August 28th and again by a second observer on August 30th. Counts were 21,319 live and 1,189 dead by one observer and 25,140 live and 2,200 dead by the second. These surveys were also thought to be prior to peak abundance. Observations were judged to be roughly twice the BEG for this index area. The Noatak River was flown on August 31st under relatively poor conditions and prior to peak abundance. 84,055 live and 30 dead chum salmon were observed. After August 31st rain caused severe turbidity. In general escapement numbers and distribution were judged to be good. Observations indicated the escapement to be within the BEG range.

2000 Outlook

The outlook for the 2000 season is based on the returning age classes of the 1999 season. During the 2000 season, the four and six-year old component of the return is expected to be below average, while the five-year old component is expected to be above average.

The three-year old component is generally small, and it too is likely to be near average. The commercial harvest is expected to fall within the range of 200,000 to 300,000 chum salmon, if market conditions can accept that level of harvest.

Table 9. Commercial catches of chum salmon, chinook salmon, and Dolly Varden by period in the Kotzebue District, 1999.

Period	Date	Hours Fished	Number of Fishermen	Catch Rate (chum)	Chum			Chinook			Dolly Varden		
					Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.
1	12-Jul-99	12	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
2	13-Jul-99	12	1	21.0	252	2,016	8.0	0	0	0.0	0	0	0.0
3	15-Jul-99	12	4	12.7	611	4,888	8.0	0	0	0.0	0	0	0.0
4	16-Jul-99	12	3	11.0	395	3,160	8.0	0	0	0.0	0	0	0.0
5	19-Jul-99	12	2	7.9	189	1,512	8.0	0	0	0.0	0	0	0.0
6	20-Jul-99	12	3	10.6	383	3,064	8.0	0	0	0.0	0	0	0.0
7	7/22/1999 ^a	5	2	25.8	258	2,064	8.0	0	0	0.0	0	0	0.0
8	7/23/1999 ^a	5	1	1.8	9	72	8.0	0	0	0.0	0	0	0.0
9	7/24/1999 ^a	1	0.67	120.9	81	648	8.0	0	0	0.0	0	0	0.0
10	7/26/1999 ^a	1	0.67	249.3	167	1,336	8.0	0	0	0.0	0	0	0.0
11	28-Jul-99	12	20	55.8	13,398	107,184	8.0	1	7	7.0	1	6	6.0
12	29-Jul-99	12	15	20.3	3,659	29,272	8.0	0	0	0.0	2	16	8.0
13	30-Jul-99	12	23	29.0	7,999	63,992	8.0	0	0	0.0	2	16	8.0
14	2-Aug-99	12	28	45.5	15,303	122,424	8.0	1	22	0.0	8	55	6.9
15	4-Aug-99	12	27	31.5	10,202	81,616	8.0	0	0	0.0	1	10	10.0
16	6-Aug-99	12	36	33.8	14,589	116,762	8.0	1	10	10.0	8	73	9.1
17	9-Aug-99	12	33	44.1	17,483	139,864	8.0	0	0	0.0	22	167	7.6
18	11-Aug-99	12	34	25.0	10,210	81,680	8.0	0	0	0.0	2	15	7.5
19	12-Aug-99	12	25	27.8	8,346	66,768	8.0	1	41	41.0	8	63	7.9
20	13-Aug-99	12	20	30.3	7,271	58,168	8.0	0	0	0.0	2	14	7.0
21	16-Aug-99	12	23	32.0	8,836	70,688	8.0	0	0	0.0	11	90	8.2
22	17-Aug-99	12	28	21.7	7,287	58,296	8.0	0	0	0.0	13	95	7.3
23	18-Aug-99	12	23	15.8	4,356	34,848	8.0	0	0	0.0	9	86	9.6
24	19-Aug-99	12	5	16.6	997	7,976	8.0	0	0	0.0	5	28	5.6
25	20-Aug-99	12	14	5.2	871	6,968	8.0	0	0	0.0	8	62	7.8
26	23-Aug-99	12	15	11.7	2,104	16,840	8.0	0	0	0.0	106	830	7.8
27	24-Aug-99	12	11	10.4	1,369	10,952	8.0	0	0	0.0	105	741	7.1
28	25-Aug-99	12	12	5.0	722	5,776	8.0	0	0	0.0	239	1,675	7.0
29	26-Aug-99	12	9	5.5	594	4,752	8.0	1	7	7.0	401	3,071	7.7
30	27-Aug-99	12	10	9.8	1,179	9,432	8.0	0	0	0.0	549	4,239	7.7
Totals		324	60		139,120	1,113,018	8.0	5	80	16.0	1,502	11,352	7.6

^a Test fish catches not sold

^b Fishing 100 rather than 150 fathoms of gear

Table 10. Historical average age composition by period for the recent 20 years (1979-1998) and 1999.

20 Year Average		Percent				Catch by Age			
Period	Catch	3	4	5	6	3	4	5	6
1	3,028	0.4	32.6	61.0	6.5	12	987	1,847	197
2	5,130	0.8	38.7	54.0	6.0	41	1,985	2,770	308
3	9,620	1.3	40.0	52.3	6.5	125	3,848	5,031	625
4	17,028	1.2	48.5	45.8	4.5	204	8,259	7,799	766
5	20,826	1.3	46.7	46.2	5.6	271	9,726	9,622	1,166
6	27,583	1.9	52.6	41.7	3.5	524	14,509	11,502	965
7	32,901	2.8	56.8	37.3	3.1	921	18,688	12,272	1,020
8	35,904	4.1	59.4	33.1	2.9	1,472	21,327	11,884	1,041
9	34,507	5.2	59.4	32.7	3.0	1,794	20,497	11,284	1,035
10	38,928	5.8	62.0	30.3	2.0	2,258	24,135	11,795	779
11	22,572	10.7	63.8	23.5	1.5	2,415	14,401	5,304	339
12	13,865	11.6	59.2	26.6	2.2	1,608	8,208	3,688	305
13	9,473	9.9	61.5	26.3	2.3	938	5,826	2,491	218
14	6,825	9.4	61.3	28.0	1.3	642	4,184	1,911	89
15	3,020	5.1	66.0	27.1	1.5	154	1,993	818	45

Kotzebue Sound commercial catch and age composition, 1999.

		Percent				Catch by Age			
Period	Catch	3	4	5	6	3	4	5	6
1	252	0.0	84.5	13.8	1.7	0	213	35	4
2	1,006	0.8	76.2	22.6	0.4	8	767	227	4
3	572	0.9	83.0	15.2	0.4	5	475	87	2
4	348	0.4	88.8	8.4	2.4	1	309	29	8
5	13,398	0.0	85.2	11.8	2.3	0	11,415	1,581	308
6	11,658	0.0	89.7	9.5	0.8	0	10,457	1,108	93
7	25,505	0.8	85.2	13.7	0.4	204	21,730	3,494	102
8	14,589	0.0	89.0	9.1	0.4	0	12,984	1,328	58
9	27,693	0.8	92.9	6.0	0.0	222	25,727	1,662	0
10	15,617	0.8	84.6	14.2	0.4	125	13,212	2,218	62
11	20,479	0.8	85.5	11.6	2.0	164	17,510	2,376	410
12	1,868	2.3	90.6	7.0	0.0	43	1,692	131	0
13	4,195	4.1	89.2	6.6	0.0	172	3,742	277	0
14	1,773	3.1	83.1	12.0	1.3	55	1,473	213	23
15									

Table 11. Kobuk River chum salmon drift test fish mean daily and cumulative CPUE, 1993-1999.

Date	1993		1994		1995		1996		1997		1998		1999	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
05-Jul														
06-Jul														
07-Jul														
08-Jul														
09-Jul							12.77	12.77	5.85	5.85				
10-Jul							15.00	27.77	0.00	5.85	5.22	5.22		
11-Jul							98.38	126.15	5.31	11.16	0.85	6.07	0	0
12-Jul	11.18	11.18			0.00	0.00	45.54	171.69	7.19	18.35		6.07	0	0
13-Jul	14.22	25.40	0.00	0.00	0.93	0.93	74.29	245.98		18.35	15.89	21.96	0	0
14-Jul	20.57	45.97	2.68	2.68	2.80	3.73		245.98	6.25	24.60	7.53	29.49	0	0
15-Jul	35.08	81.05	2.58	5.26	2.77	6.50	83.73	329.73	3.65	28.25	14.07	43.56	0	0
16-Jul	13.19	94.24	11.35	16.61		6.50	71.35	401.08	14.28	42.53	17.33	60.89	0	0
17-Jul	17.27	111.51		16.61	0.00	6.50	55.49	456.57	15.17	57.70	5.07	65.96	4.26	4.26
18-Jul		111.51	7.16	23.77	1.81	8.31	89.86	546.43	16.12	73.82	9.02	74.98	8.48	12.74
19-Jul	10.71	122.22	12.40	36.17	9.89	18.20	54.74	601.17	17.98	91.80		74.98	5.89	18.63
20-Jul	2.76	124.98	3.65	39.82	16.30	34.50	63.70	664.87		91.80	18.66	93.64	5.11	23.74
21-Jul	3.20	128.18	7.30	47.12	38.54	73.04	52.12	716.99	18.53	110.33	11.87	105.51	23.75	47.49
22-Jul	5.52	133.70	3.56	50.68	21.18	94.22	50.97	767.96	13.28	123.61		105.51	11.91	59.40
23-Jul	27.15	160.85	18.49	67.17	50.58	144.80	91.36	859.32	10.79	134.40	29.58	135.09	6.09	65.49
24-Jul	9.06	169.91		67.17	28.46	173.26	91.89	951.21	22.86	157.26	27.33	162.42	24.95	90.44
25-Jul		169.91	14.38	81.55	40.16	213.42	76.80	1,028.01	21.57	178.83	24.68	187.10	28.73	119.17
26-Jul	15.22	185.13	47.65	129.20	35.15	248.57	55.68	1,083.69	14.66	193.49		187.10	39.72	158.89
27-Jul	8.06	193.19	40.66	169.86	63.94	312.51	29.79	1,113.48	18.46	211.95	23.91	211.01	80.39	239.28
28-Jul	16.36	209.55	57.83	227.69	62.49	375.00	49.06	1,162.54	30.53	242.48	51.91	262.92		239.28
29-Jul	0.93	210.48	33.62	261.31	46.11	421.11	70.13	1,232.67	28.13	270.61	34.16	297.08	55.00	294.28
30-Jul	0.92	211.40	69.21	330.52	57.86	478.97	35.29	1,267.96	22.33	292.94	24.59	321.67	49.66	343.94
31-Jul	12.58	223.98		330.52	29.89	508.86	82.27	1,350.23	32.57	325.51	15.69	337.36	160.53	504.47
01-Aug		223.98	82.16	412.68	72.91	581.77	167.67	1,517.90	41.41	366.92	25.44	362.80	145.02	649.49
02-Aug	6.74	230.72	65.12	477.80	48.71	630.48	62.02	1,579.92	22.41	389.33		362.80	41.67	691.16
03-Aug	54.49	285.21	71.79	549.59	48.40	678.88	48.7	1,628.62	35.21	424.54	26.67	389.47	33.19	724.35
04-Aug	44.23	329.44	108.98	658.57	53.00	731.88	65.93	1,694.55	26.67	451.21	42.35	431.82	74.23	798.58
05-Aug	89.30	418.74	59.74	718.31	49.95	781.83	60.33	1,754.88	24.47	475.68	8.57	440.39	108.04	906.62
06-Aug	18.60	437.34	102.56	820.87		781.83	80.47	1,835.35	42.25	517.93	6.00	446.39	82.79	989.41
07-Aug	20.52	457.86		820.87	46.39	828.22	90.99	1,926.34	36.00	553.93	5.11	451.50	82.73	1,072.14
08-Aug		457.86	62.75	883.62	44.02	872.24	146.94	2,073.28	45.07	599.00	16.40	467.90		1,072.14
09-Aug	1.84	459.70	96.86	980.48	68.22	940.46	106.11	2,179.39	55.14	654.14	17.20	485.10	55.58	1,127.72
10-Aug	12.63	472.33	45.83	1,026.31	56.33	996.79	56.95	2,236.34		654.14	9.46	494.56	44.73	1,172.45
11-Aug	18.11	490.44	57.02	1,083.33	37.95	1,034.74		2,236.34	43.45	697.59	10.29	504.85	58.13	1,230.58
12-Aug	3.74	494.18	90.54	1,173.87	63.92	1,098.66	72.29	2,308.63	37.36	734.95	19.44	524.29	48.50	1,279.08
13-Aug			11.36	1,185.23		1,098.66	114.63	2,423.26	45.93	780.88	10.21	534.50	78.37	1,357.45
14-Aug				1,185.23	29.35	1,128.01	158.13	2,581.39	16.01	796.89	3.85	538.35		
15-Aug			5.13	1,190.36	25.26	1,153.27					0	538.35		
16-Aug			16.23	1,206.59	35.04	1,188.31								
17-Aug			0.00	1,206.59										
18-Aug			0.00	1,206.59										
19-Aug			3.12	1,209.71										
20-Aug			0.00	1,209.71										
21-Aug				1,209.71										
22-Aug			0.00	1,209.71										
23-Aug			0.00	1,209.71										
24-Aug			0.00	1,209.71										
25-Aug			0.91	1,210.62										
26-Aug			5.56	1,216.18										
27-Aug			1.86	1,218.04										
28-Aug			0.93	1,218.97										
29-Aug			0.00	1,218.97										
30-Aug			0.00	1,218.97										

* Regular day off.

Table 12. Subsistence salmon harvests, Kotzebue Sound, 1999.

			Chinook		Chum		Pink		Sockeye		Coho		Total	
	Total HH's	HH's Contacted	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total	Reported Harvest	Est. ^a Total
Ambler	71	21	0	0	590	590	0	0	0	0	100	100	690	690
Kiana ^b	91	67	3	5	1,490	3,788	4	7	0	0	20	33	1,517	3,832
Kobuk	23	13	0	0	1,438	1,869	0	0	0	0	0	0	1,438	1,869
Kotzebue ^c	832	162	0	0	12,611	64,768	159	817	93	478	234	1,202	13,097	67,264
Noatak	91	14	0	0	1,616	1,616	10	10	0	0	0	0	1,626	1,626
Noorvik	118	48	2	4	9,027	17,843	4	8	0	0	0	0	9,033	17,855
Shungnak	51	28	0	0	1,719	3,868	0	0	0	0	0	0	1,719	3,868
KOTZEBUE SOUND	1,277	353	5	9	28,491	94,342	177	841	93	478	354	1,334	29,120	97,004

^a Data from contacted households were expanded to households not contacted. If less than 30 and less than 50% of households in a community were contacted, then reported harvest is used for estimated harvest.

^b Estimated chum salmon harvest in Kiana includes 1,373 chum from the ADF&G test net fishery in addition to the survey results.

^c Alaska Department of Fish and Game, Division of Subsistence, postcard survey, 1999.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1999.

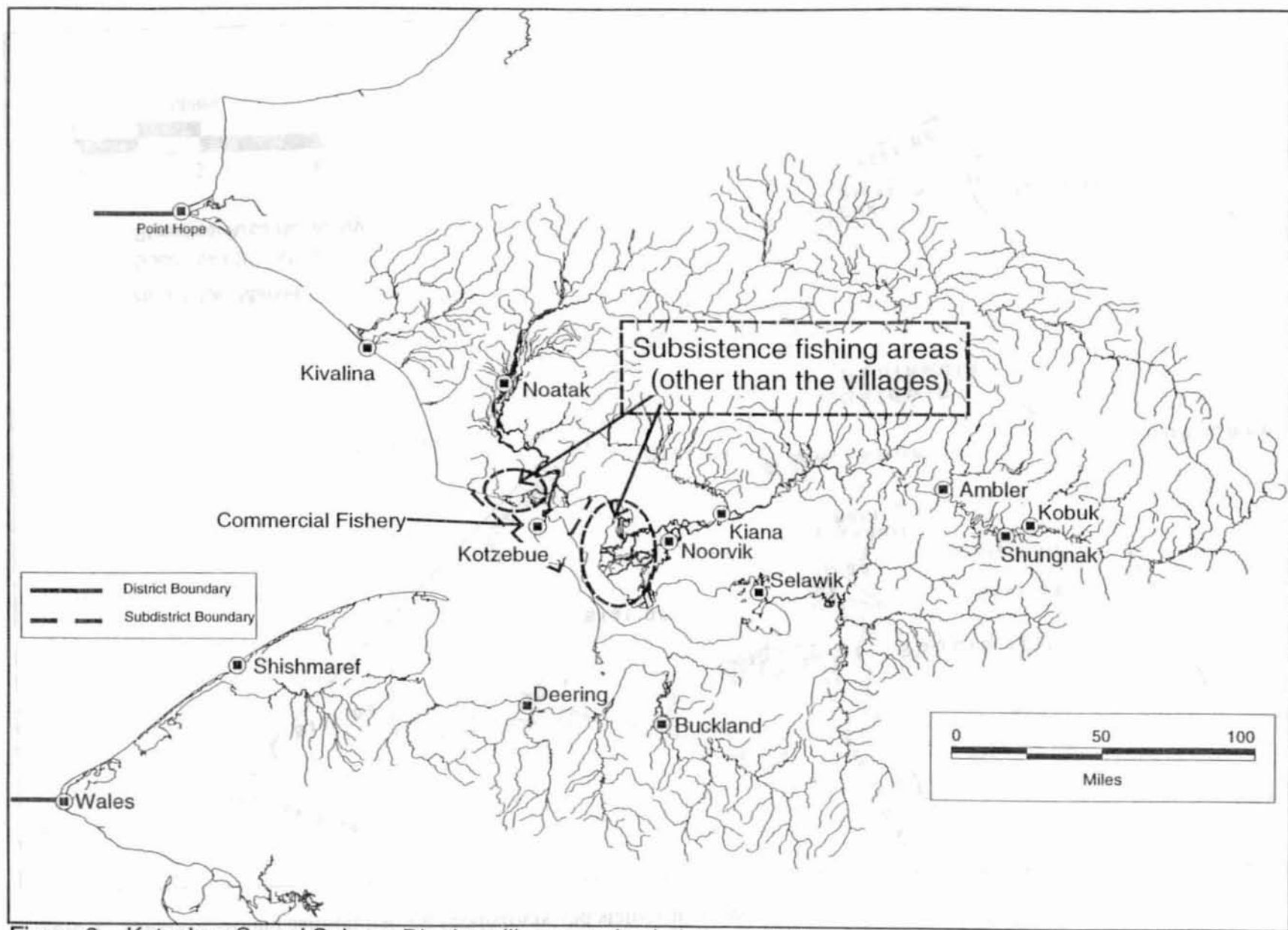
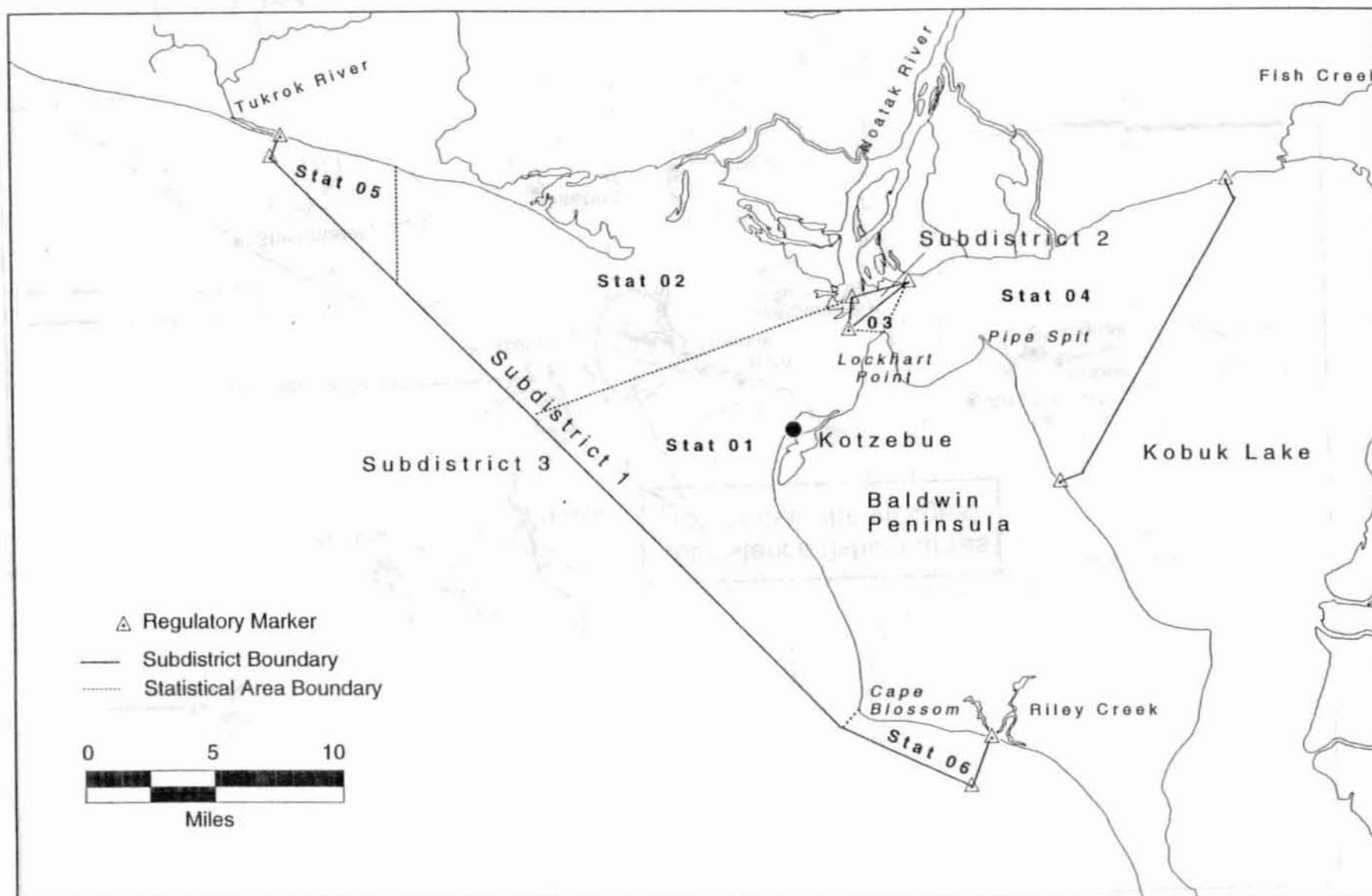


Figure 3. Kotzebue Sound Salmon District, villages and subsistence fishing areas.

Figure 4. Kotzebue Sound salmon fishing subdistricts and statistical areas.



Kotzebue District Historical Commercial Chum Salmon Catch

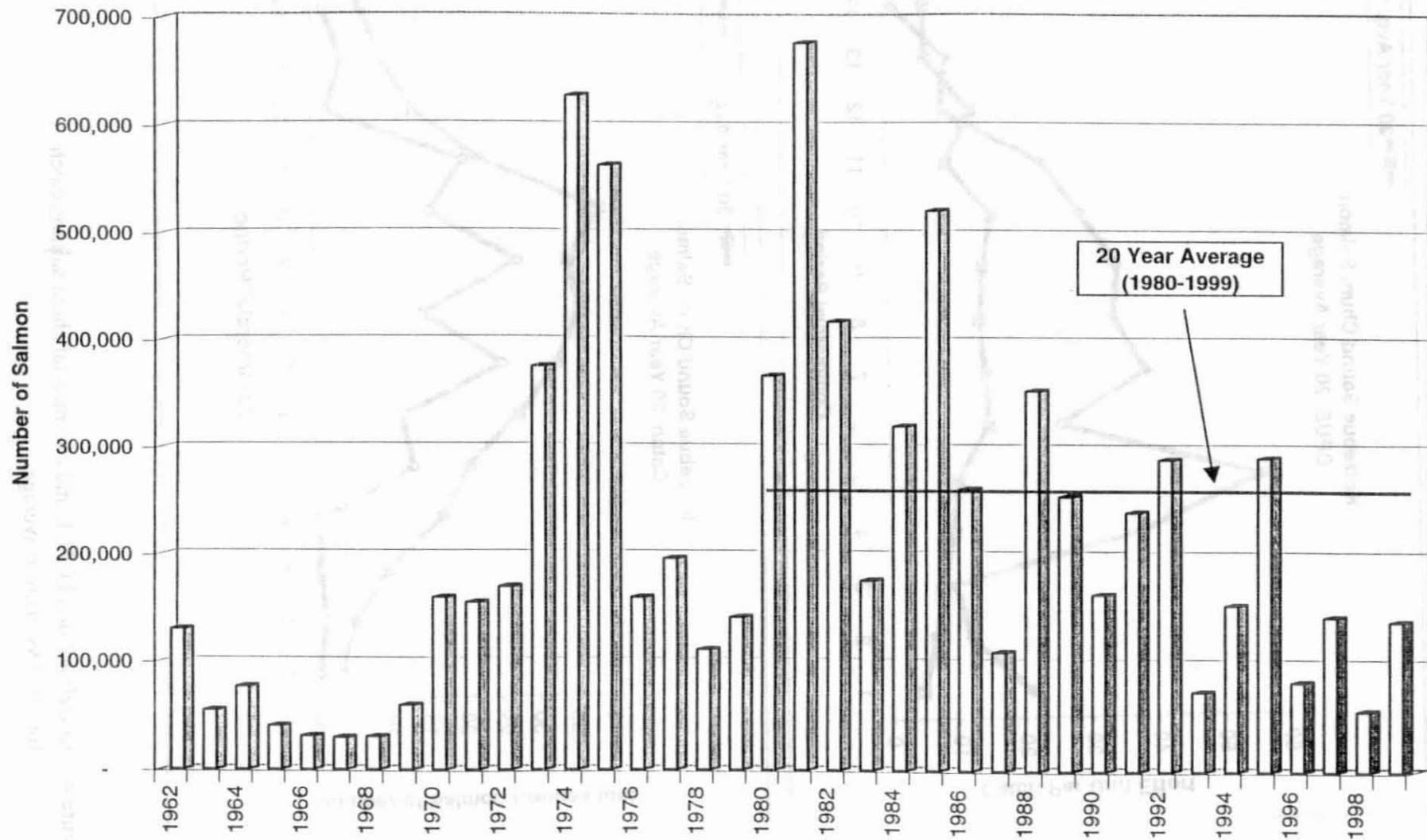


Figure 5. Kotzebue District chum salmon commercial catch by year, 1962-1999, and the 20 year average.

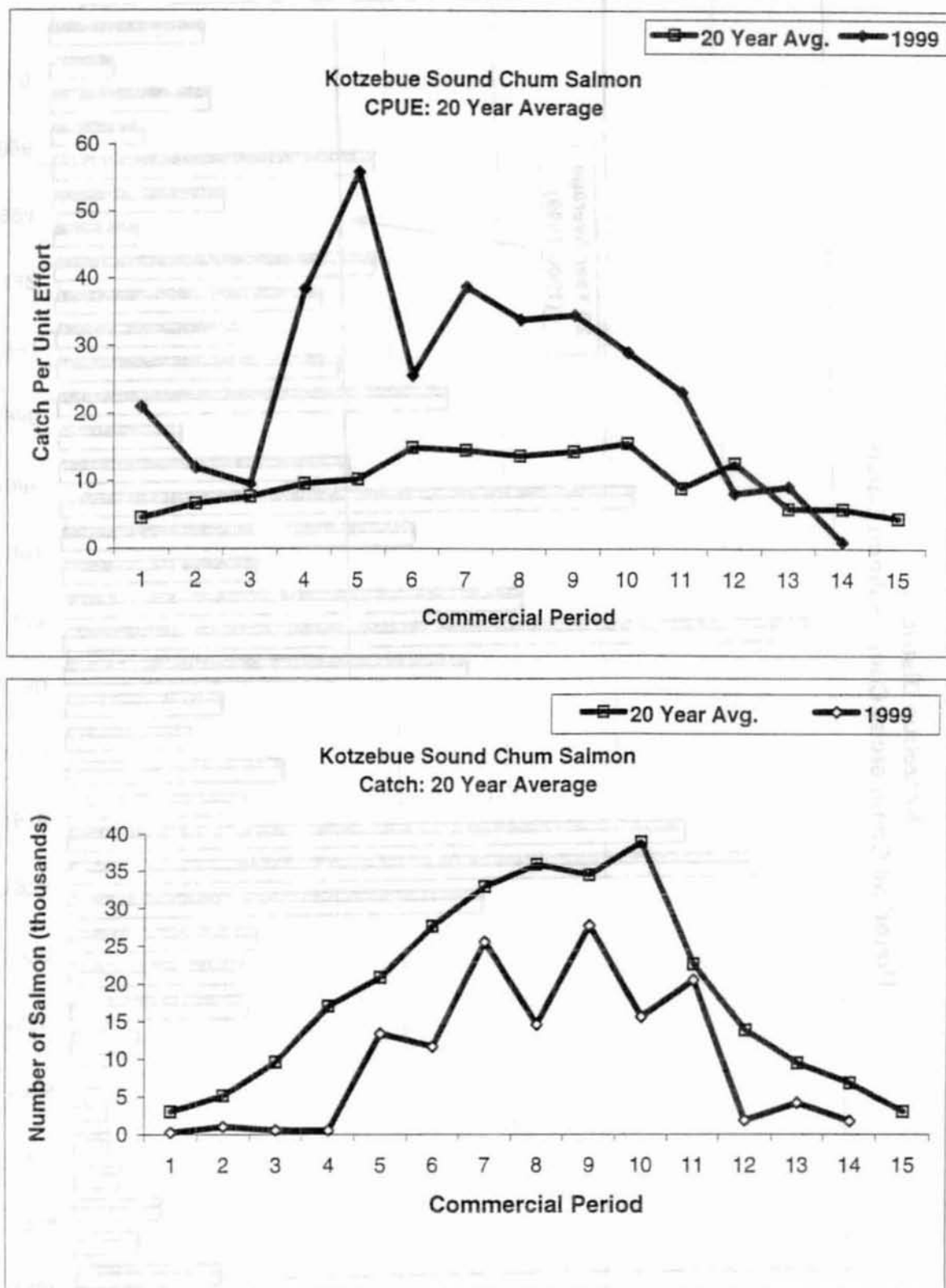


Figure 6. Kotzebue Sound CPUE and commercial chum salmon catch for 1999 vs historic average.

Kobuk River Test Fish Cumulative CPUE

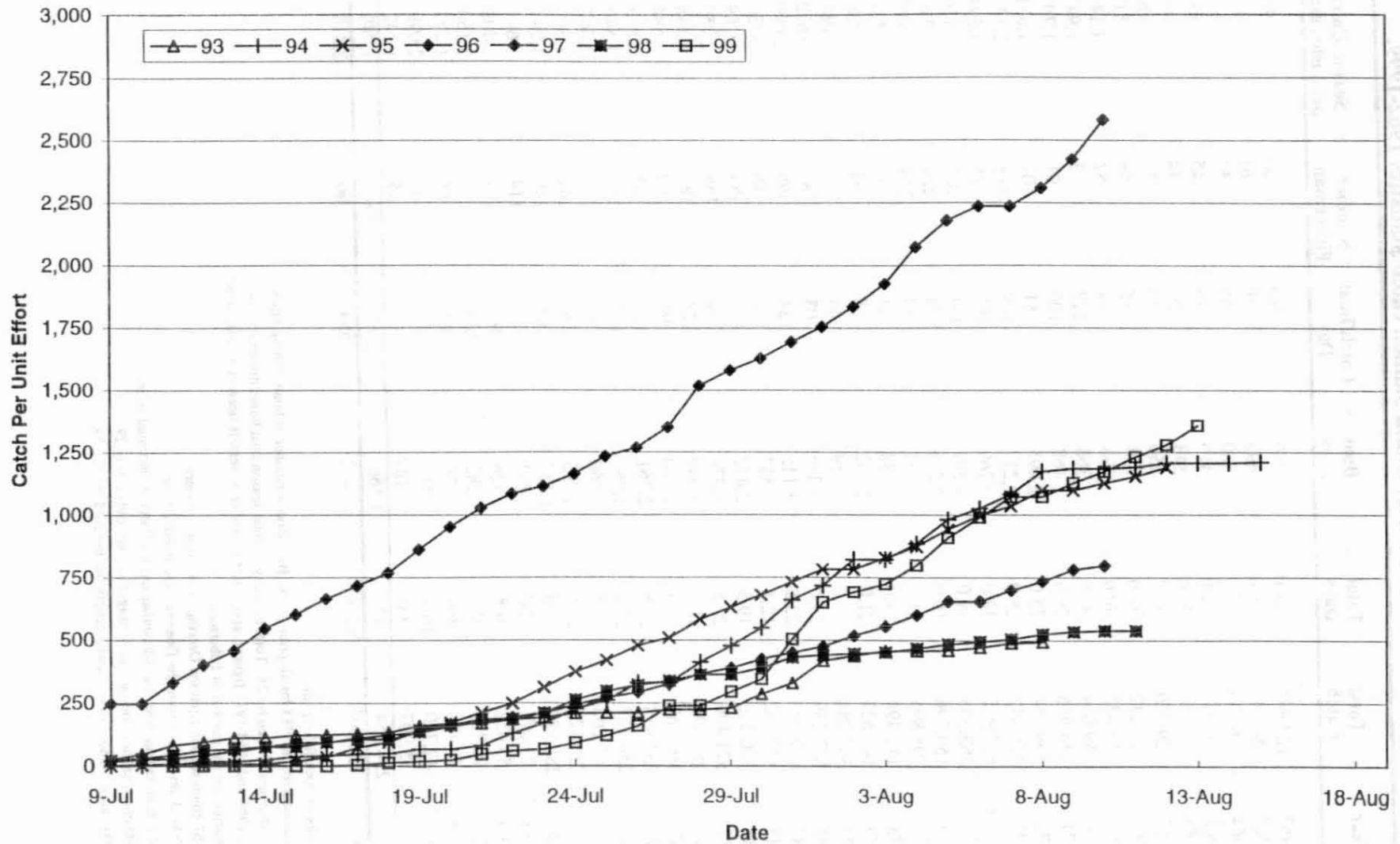


Figure 7. Kobuk River chum salmon drift test fish cumulative CPUE, 1993 - 1999.

Appendix Table C1. Kotzebue District Chum Salmon catch Statistics 1962-1999.

Year	Total Catch	Total Days ^a	Boat Days ^b	Catch/Boat Day	Number Fisherman ^c	Season Catch per Fisherman
1962	129,948	21.0	793	164	84	1,547
1963	54,445	20.0	693	79	61	893
1964	76,449	27.0	560	137	52	1,470
1965	40,025	32.0	410	98	45	889
1966	30,764	35.0	548	56	44	699
1967	29,400	33.0	556	53	30	980
1968	30,212	34.0	858	35	59	512
1969	59,335	40.0	798	74	52	1,141
1970	159,664	32.0	1,368	117	82	1,947
1971	154,956	29.0	1,468	106	91	1,703
1972	169,664	35.0	2,095	81	104	1,631
1973	375,432	25.0	2,217	169	148	2,537
1974 ^d	627,912	32.0	3,769	167	185	3,394
1975 ^e	563,345	39.0	4,301	131	267	2,110
1976	159,796	16.0	2,236	71	220	726
1977	195,895	21.0	2,353	83	224	875
1978	111,494	23.0	2,738	41	208	536
1979	141,623	21.0	2,462	58	181	782
1980	367,284	27.0	2,559	144	176	2,087
1981	677,239	27.0	3,336	203	187	3,622
1982	417,790	23.5	3,115	134	199	2,099
1983	175,762	12.5	1,557	113	189	930
1984	320,206	19.5	2,432	132	181	1,769
1985	521,406	25.5	3,376	154	189	2,759
1986	261,436	15.5	2,049	128	187	1,398
1987	109,467	11.5	1,160	94	160	684
1988	352,915	21.5	2,761	128	193	1,829
1989	254,617	22.2	1,961	130	165	1,543
1990	163,263	11.5	1,760	93	153	1,067
1991	239,923	22.5	1,795	134	142	1,690
1992	289,184	17.0	1,513	191	149	1,941
1993 ^f	73,071	7.0	431	170	114	641
1994 ^g	153,452	9.8	426	360	109	1,408
1995	290,730	9.7	282	1031	92	3,160
1996 ^h	82,110	6.0	76	1080	55	1,493
1997	142,720	16.5	330	432	68	2,099
1998	55,907	13.0	187	300	45	1,242
20 yr Average	254,354	17	1,566	290	141	1,789
1999	138,605	12.0	212	654	60	2,310

a Day = 24 hours of open fishing time.

b Boat days standardized in 1983 for all prior years. Boat days = number of boats fishing times period length in hours divided by 24. Total boat days = total season boat hours divided by 24.

c During 1962-1966 and 1968-1971 figures represent the number of vessels licensed to fish in the Kotzebue District, not the number of fishermen.

d Includes 6,567 chum salmon from the Deering experimental fishery.

e Includes 10,704 chum salmon from the Deering experimental fishery.

f Includes 2,000 chum salmon from the Sikusuilaq springs Hatchery terminal fishery.

g Includes 4,000 chum salmon commercially caught but not sold on July 29.

h Includes 2,200 chum salmon commercially caught but not sold on July 29.

Appendix Table C2. Kotzebue District chum salmon type of processing and weights, 1962-1999.

Year	Chum Salmon		Other ^a	Fresh Frozen Salmon Roe (pounds)	Cured Pounds
	Cases (48lbs)	Fresh Frozen (Round weight in pounds)			
1962	14,500				
1963	5,396				
1964	5,421	202,993			
1965	1,929	207,350			
1966		310,716		13,600	3,065
1967		273,420			11,488
1968		288,500			11,850
1969		455,013			8,183
1970		1,240,000			48,377
1971		1,264,753			27,542
1972		1,547,041			55,376
1973		3,416,431			144,768
1974		5,361,130 ^b			
1975		4,877,313 ^c			
1976		1,415,549	487		
1977		1,846,340	1,075		
1978		1,009,121	32,419		
1979		1,236,429	6,155		
1980		3,160,948	7,828		
1981		6,139,518	2,210		
1982		3,833,051	790	100	
1983		1,647,160	2,449		
1984		2,631,582	1,593		
1985		4,528,379	1,106		
1986		2,271,320	1,691		
1987		900,405	597		
1988		3,060,292	2,120		
1989		2,163,174	1,426		
1990		1,453,040	538		
1991		1,951,041	714		
1992		2,397,302	2,714		
1993 ^d		613,968	1,507	1,000	
1994 ^e		1,166,494	73		
1995		2,329,898	93		
1996 ^f		97,510	51		
1997		1,141,741	649		
1998		447,256	2,971		
1999		1,108,898	87		

^a Chinook and pink salmon.^b Includes 36,775 pounds from the experimental commercial fishery at Deering.^c Includes 80,801 pounds from the experimental commercial fishery at Deering.^d Includes 11,160 pounds from the Sikusuilag Springs Hatchery terminal fishery. Pounds of roe stripped are from a verbal report.^e Includes 31,500 pounds commercially caught but not reported on fish tickets.^f Includes 17,600 pounds commercially caught but not sold on fish tickets.

Appendix Table C3. Kotzebue District commercial salmon fishery dollar value estimates, 1962-1999.^a

Year	Gross Value of Catch to Fishermen	Wholesale Value of Pack ^b	License and Tax Revenue to State
1962	\$4,500	\$304,500	\$11,635
1963	\$9,140	\$113,316	\$6,040
1964	\$34,660	\$158,020	\$5,279
1965	\$18,000	\$83,294	\$2,952
1966	\$25,000	\$84,630	\$2,820
1967	\$28,700	\$100,450	\$4,245
1968	\$46,000	\$62,000	\$2,800
1969	\$71,000	^f	
1970	\$186,000	^f	\$5,520
1971 ^c	\$200,000	^f	\$5,970
1972 ^d	\$260,000	^f	
1973	\$925,000	^f	
1974	\$1,822,784	^f	\$18,121
1975	\$1,365,648	^f	\$16,955
1976	\$580,375	^f	\$15,364
1977	\$1,033,950	^f	\$19,960
1978	\$575,260	^f	\$9,913 ^e
1979	\$990,263	^f	\$18,302 ^e
1980	\$1,446,633	^f	\$11,820 ^e
1981	\$3,246,793	^f	\$11,220 ^e
1982	\$1,961,518	^f	\$7,085 ^e
1983	\$420,736	^f	\$24,097 ^e
1984	\$1,148,884	^f	\$39,696 ^e
1985	\$2,137,368	^f	\$6,720 ^g
1986	\$931,241	^f	\$6,840 ^g
1987	\$515,000	^f	\$6,930 ^g
1988	\$2,581,333	^f	\$11,490 ^g
1989	\$613,823	^f	\$11,250 ^g
1990	\$438,044	^f	\$11,370 ^g
1991	\$437,948	^f	\$10,920 ^g
1992	\$533,731	^f	\$10,565 ^g
1993 ^h	\$235,061	^f	\$10,645 ^g
1994	\$233,512	^f	\$10,520 ^g
1995	\$316,031	^f	\$10,315 ^g
1996	\$56,310	^f	\$10,565 ^g
1997	\$187,978	^f	\$11,050 ^g
1998	\$70,578	^f	\$10,150 ^g
1999	\$179,781	^f	\$10,150 ^g

^a Some estimates between 1962 and 1981 include only chum value which in figures represent over 99% of the total value. Figures after 1981 represent the chum value as well as incidental species such as char, whitefish and other salmon.

^b Based on type of processing when fish were shipped out of the district.

^c Includes \$9,193 from the experimental commercial fishery at Deering.

^d Includes \$17,776 from the experimental commercial fishery at Deering.

^e Includes permit and vessel fees only.

^f Information not available.

^g Includes permit renewal fees only; vessels were not required.

^h Includes \$3,648 from the Sikusuilaq Springs Hatchery terminal fishery.

Appendix Table C4. Kotzebue District mean prices paid per pound to salmon fishermen by species, 1962-1999 ^a

Year	Chum Salmon		Chinook Salmon	Pink Salmon	Inconnu	Dolly Varden
	Average Weight	Average Price				
1962		\$0.35 ^c				
1963		\$0.35 ^c				
1964	8.3	\$0.45 ^c				
1965	9.0	\$0.45			\$1.30 ^c	
1966	10.1	\$0.11			\$1.40 ^c	\$0.55
1967	9.3	\$0.11			\$1.50 ^c	\$0.75
1968	9.7	\$0.14			\$0.91 ^c	\$0.98
1969	7.5	\$0.15			\$1.30 ^c	\$2.84
1970	8.1	\$0.15				
1971	8.1	\$0.16			\$0.16	\$0.17
1972	9.1	\$0.17			\$0.20	\$0.17
1973	9.1	\$0.25			\$0.30	\$0.16
1974 ^b	8.5	\$0.34			\$0.30	\$0.16
1975 ^b	8.6	\$0.28			\$0.30	\$0.30
1976	8.9	\$0.41			\$0.30	\$0.30
1977	9.6	\$0.56			\$0.30	
1978	9.1	\$0.57			\$0.30	\$0.25
1979	8.8	\$0.80				\$0.25
1980	8.6	\$0.46			\$0.10	\$0.20
1981	9.1	\$0.53			\$0.75	\$0.17
1982	9.3	\$0.51	\$1.25	\$0.15	\$0.75	\$0.20
1983	9.4	\$0.25	\$1.08	\$0.13		\$0.20
1984	8.2	\$0.44	\$1.03			\$0.25
1985	8.7	\$0.47	\$1.25			\$0.25
1986	8.7	\$0.41	\$1.25			\$0.20
1987	8.2	\$0.57	\$1.25			\$0.30
1988	8.7	\$0.85	\$1.98			\$0.35
1989	8.5	\$0.28	\$1.72			\$0.28
1990	8.9	\$0.31	\$2.00			\$0.25
1991	8.1	\$0.22	\$1.64		\$0.50	\$0.18
1992	8.3	\$0.22	\$1.89		\$0.58	\$0.10
1993	8.5	\$0.38	\$2.37		\$0.50	\$0.10
1994	7.8	\$0.20	\$1.14			\$0.17
1995	8.0	\$0.13	\$1.00		\$0.50	\$0.20
1996	8.0	\$0.09	\$1.00		\$0.44	\$0.25
1997	8.0	\$0.16	\$1.02			\$0.20
1998	8.0	\$0.15	\$1.00			\$0.20
1999	8.0	\$0.16	\$1.00			\$0.20

^a Information not available for some species in some years.

^b Includes price paid to fishermen of Deering during the experimental commercial fishery.

^c Price per fish.

Appendix Table C5. Kotzebue District commercial and subsistence salmon catches, 1914-1999.

Year ^a	Commercial Catch		Total	Subsistence Chum Catch			
	Chum ^b	Other ^c		Chum	Number of Fishermen Interview	Average Catch per Fishermen	Total Documented Catch
1914	8,550		8,550				
1915	4,750		4,750				
1916	19,000		19,000				
1917	44,612		44,612				
1918	27,407		27,407				
1957				298,430 ^d			
1962	129,948	27	129,975	70,283	81	868	200,258
1963	54,445	143	54,588	31,069	67	464	85,657
1964	76,499	5	76,504	29,762	58	513	106,266
1965	40,034		40,034	30,500	89	343	70,534
1966	30,764	1	30,765	35,588	121	294	66,353
1967	29,400		29,400	40,108	135	297	69,508
1968	30,384 ^e		30,384	20,814	65	320	51,198
1969	59,335	48	59,383	29,812	99	301	89,195
1970	159,664		159,664	28,486	164	174	188,150
1971	154,956	1	154,957	23,959	152	158	178,916
1972	169,664	3	169,667	11,085	96	115	180,752
1973	375,432	5	375,437	18,942	101	188	394,379
1974	634,479 ^f	48	634,527	26,729	88	304	661,256
1975	563,682 ^g	36	563,718	27,605	95	291	591,323
1976	159,796	2	159,798	15,765	91	173	175,563
1977	195,895		195,895	9,752	83	117	205,647
1978	111,494	7,007	118,501	12,864	85	151	131,365
1979	141,623	910	142,533	14,605	97	151	157,138
1980	367,284	1,654	368,938	10,945	111	99	379,883
1981	677,239	237	677,476	17,766	71	250	695,242
1982	417,790	57	417,847	30,133	204	148	447,980
1983	175,762	229	175,991	8,262 ^h	46	180	184,253
1984	320,206	107	320,313	15,508 ^h	66	235	335,821
1985	521,406	63	521,469	13,494 ⁱ	243	56	534,963
1986	261,436	106	261,542	36,311	837	43	297,853
1987	109,467	44	109,511	j	j	j	109,511
1988	352,915	152	353,067	j	j	j	353,067
1989	254,617	87	254,704	j	j	j	254,704
1990	163,263	32	163,295	j	j	j	163,295
1991	239,923	44	239,967	j	j	j	239,967
1992	289,184	204	289,388	j	j	j	289,388
1993	73,071 ^k	131	73,202	j	j	j	73,202
1994	153,452 ^l	3	153,455	36,226 ⁿ	375	97	189,681
1995	290,730	5	290,735	102,880	593	173	393,615
1996	82,110 ^m	3	82,113	99,740	596	167	181,853
1997	142,720	45	142,765	57,906	530	109	200,671
1998	55,907	210	56,117	48,979	592	83	105,096
1999	139,120	5	139,125	94,342	353	267	233,467
1979-99				1994-98			
Average	249,011	206	249,217	Average	73,346	507	149

^a There was no commercial fishing during 1919-1961.^b Catches for 1914-1918 are from pack data only. Number of chum salmon estimate at 9.5 per case (#48) and 34 per barrel.^c Includes pink, chinook, and sockeye salmon.^d Estimated mean annual catches prior to 1957 (study by Raleigh).^e Corrected from 1968 annual report due to addition of late catches.^f Includes 6,567 chum salmon from the Deering experimental fishery.^g Includes 10,704 chum salmon from the Deering experimental fishery.^h Partial survey.ⁱ Does not include harvest from the villages of Noatak and Kivalina.^j Not surveyed.^k Includes 2,000 chum salmon from the Sikusuiq Springs Hatchery terminal fishery.^l Includes 4,000 chum salmon commercially harvested on August 5 but not sold.^m Includes 2,200 chum salmon commercially harvested on July 29 but not sold.ⁿ Does not include the town of Kotzebue.

A Table C6. Kotzebue District subsistence chum salmon catches by village, 1962-1999.

Year	Village							Village						District Total
	Noorvik	Kiana	Ambler	Shungnak	Kobuk River	Villages	Noatak Village	Kotzebue	Deering	Kivalina	Buckland	Candle	Shishmaref	
1962	15,934	3,139	^b	^b	2,321	21,394	48,890	^b						70,284
1963	4,304	1,973	755	1,240	200	8,472	16,762	5,835	^b	^b	^b	^b	^b	31,069
1964	2,167	783	2,142	3,134	1,020	9,246	12,763	7,753	^b	^b	^b	^b	^b	29,762
1965	5,596	1,598	1,340	2,160	877	11,571	5,671	8,058	5,200	^b	^b	^b	^b	30,500
1966	3,141	433	912	899	625	6,010	19,700	3,640	6,238	^b	^b	^b	^b	35,588
1967	2,350	1,489	679	1,500	175	6,193	26,512	4,032	3,098	^b	162	11	100	40,108
1968	2,424	2,488	457	1,600	1,030	7,999	5,490	4,324	2,838	^b	37	89	37	20,814
1969	1,301	2,458	3,525	2,550	1,655	11,489	14,458	1,768	1,897	^b	-	200	-	29,812
1970	6,077	3,457	2,899	3,450	600	16,483	4,120	6,814	1,242	^b	344	113	-	29,116
1971	7,144	5,177	2,299	2,653	1,931	19,204	9,919	1,737	763	^b	155	50	131	31,959
1972	1,744	1,435	1,469	2,665	2,119	9,432	741	1,151	369	^b	59	113	29	11,894
1973	2,312	4,470	1,529	4,406	1,917	14,634	216	1,172	1,098	^b	1,722	50	100	18,992
1974	6,809	2,726	1,651	6,243	2,251	19,680	4,330	^b	1,880	^b	639	15	200	26,744
1975	4,620	4,320	3,390	9,060	1,755	23,145	1,515	^b	1,175	^b	1,540	^b	230	27,605
1976	1,555	1,579	2,000	4,213	562	9,909	4,448	^b	1,358	^b	^b	^b	^b	15,715
1977	891	766	385	1,760	325	4,127	2,125	^b	3,500	^b	^b	^b	^b	9,752
1978	2,034	1,493	2,224	4,766	852	11,369	1,495	^b	^b	^b	^b	50	^b	12,914
1979	2,155	1,225	2,400	2,947	651	9,378	2,227	^b	2,000	^b	1,000	^b	^b	14,605
1980	2,229	2,551	660	2,704	350	8,494	2,135	^b	^b	^b	^b	^b	^b	10,629
1981	3,488	1,439	782	2,800	950	9,459	5,465	2,387	295	110	50	^b	^b	17,766 ^{a,c}
1982	7,433	4,918	2,506	4,191	600	19,648	5,479	4,099	807	210	^b	^b	^b	30,243 ^a
1983 ^{a,d}	277	223	1,062	3,556	368	5,486	4,035	347	219	200	^b	^b	^b	10,287
1984 ^{a,c}	^b	^b	2,990	4,241	^b	7,231	6,049	88 ^a	1,940	200	^b	^b	^b	15,508
1985	7,015	3,494	3,487	3,115	300	17,411	^b	13,494	573	^b	^b	^b	^b	31,478
1986	8,418	^b	^b	4,483	^b	12,901	1,246	36,311	^b	^b	^b	^b	^b	50,458
1987	5,092	^b	^b	1,975	^b	7,067	2,921	^b	^b	^b	^b	^b	^b	9,988
1988	7,500	^b	^b	6,223	^b	13,723	^b	^b	^b	^b	^b	^b	^b	13,723
1989	^b	^b	^b	3,894	^b	3,894	1,595	^b	^b	^b	^b	^b	^b	5,489
1990	4,353	^b	^b	^b	^b	4,353	3,915	^b	^b	^b	^b	^b	^b	8,268
1991	6,855	^b	^b	4,248	^b	11,103	3,637	^b	^b	^b	^b	^b	^b	14,740
1992	8,370	^b	^b	3,890	^b	12,260	2,043	^b	^b	^b	^b	^b	^b	14,303
1993	8,430	^b	^b	3,730	^b	12,160	3,270	^b	^b	^b	^b	^b	^b	15,430
1994	8,157	1,891	2,860	7,982	5,722	26,612	6,126	^b	3,488	^b	^b	^b	^b	36,226
1995	15,485	5,985	8,558	5,880	2,959	38,867	6,359	50,708	^b	^b	^b	^b	6,947	102,881
1996	13,611	5,935	9,062	8,649	1,819	39,076	10,091	50,573	^b	^b	^b	^b	^b	99,740
1997	14,323	3,064	2,713	5,513	629	26,242	5,309	26,355	^b	^b	^b	^b	^b	57,906
1998	9,845	3,414	2,432	4,676	1,031	21,398	2,614	24,968	^b	^b	^b	^b	^b	48,980
1999	17,843	3,788	590	3,868	1,869	27,958	1,616	64,768	^b	^b	^b	^b	^b	94,342

^a No household survey, information is from return of mail questionnaires.

^b Not surveyed.

^c Does not include 310 chum salmon taken in Selawik.

^d Household surveys were conducted in Noatak, Kivalina, and Shungnak only. Other harvest information is from limited return of mail-in calendars.

^e Household surveys were conducted in Noatak, Kivalina, Ambler, and Deering. Other harvest information is from limited return of mail-in questionnaires.

Appendix Table C7. Kotzebue District mean subsistence chum salmon catch per fisherman by village, 1962-1999.

Year	Kotzebue	Noatak	Noorvik	Kiana	Ambler	Shungnak	Kobuk	Deering
1962	^a	1190	665	350	^a	^a	335	^a
1963	650	800	160	^b	94	^b	67	^a
1964	515	710	220	260	310	^a	205	^a
1965	400	810	220	265	190	220	145	^a
1966	158	820	137	62	76	45	104	^a
1967	202	914	90	68	49	125	35	^a
1968	135	220	84	96	33	114	206	^a
1969	98	760	163	223	235	318	206	^a
1970	187	242	132	138	242	182	150	^a
1971	53	148	223	207	177	133	386	^a
1972	63	74	84	84	244	266	302	^a
1973	195	36	121	178	305	489	273	^a
1974	^a	393	324	181	165	891	450	^a
1975	^a	138	210	288	282	647	293	^a
1976	^a	212	259	79	250	281	70	^a
1977	^a	425	56	38	55	104	41	^a
1978	^a	79	88	71	131	265	142	^a
1979	^a	114	98	68	160	184	108	^a
1980	^a	164	318	213	132	246	88	^a
1981	213	579	388	131	129	233	317	^a
1982	84	189	323	246	167	262	200	81
1983 ^c	50	269	139	223	531	254	368	44
1984	44	173	^a	^a	214	303	^a	194
1985	107	^a	206	116	152	195	50	72
1986	47	69 ^d	271	^a	^a	195	^a	^a
1987	^a	225 ^d	189	^a	^a	329	^a	^a
1988	^a	^a	300	^a	^a	389	^a	^a
1989	^a	133	^a	^a	^a	216	^a	^a
1990	^a	135	198	^a	^a	^a	^a	^a
1991	^a	145	311	^a	^a	283	^a	^a
1992	^a	89	310	^a	^a	243	^a	^a
1993	^a	136	312	^a	^a	196	^a	^a
1994 ^e	^a	90	133	32	99	154	260	92
1995	71	69	123	59	110	111	110	^a
1996	73	115	117	58	111	154	76	^a
1997	41	71	125	35	39	117	28	^a
1998	35	27	79	34	30	84	41	^a
1999	77	115	151	42	28	76	81	^a

^a Not Surveyed.

^b Number of fishermen not known.

^c Means based on very limited number of mail-in calendars except for the villages of Noatak and Shungnak where interviews were conducted.

^d Partial harvest, fishermen were just beginning to fish.

^e Preliminary information based on interviews conducted by Division of Subsistence.

Appendix Table C8. Chum salmon aerial survey counts for the Kotzebue District, 1962-1999^{a,h}. (p. 1 of 4)

Stream	1962	1963	1964	1965	1966	1967	1968	1969	1970
Noatak Drainage									
Noatak River below Kelly River	168,000 ^d	1,970 ^{b,j}	89,798	6,152 ^{b,j}	101,640	29,120 ^b	39,394	33,945	
Eli River	9,080 ^d	35			120		5,502 ⁱ	68 ⁱ	138,145
Kelly River & Lake	1,818 ^d	600		3,155	570	225	375	150	
Noatak River System Total	178,898	2,605	89,798	9,307	102,330	29,345	45,271	34,163	
Kobuk Drainage									
Kobuk to Pah River		400		1,750	266		530		
Pah River to just below Selby River		1,530		500			50		1,753
Selby River mouth & Slough		1,045		500	630	1,625	70		20
Selby R. mouth to Beaver C.		1,095				75	170		4,820
Beaver Creek mouth					460	795	1,550		2,385
Above Beaver Creek		465			118				4,930
Upper Kobuk River Total	9,224^d	4,535	7,985^g	2,750	1,474	2,495	2,370	7,500^c	13,908
Squirrel River	5,834 ^d	2,200	8,009	7,230	1,350	3,332	6,746	6,714	
Salmon River	12,936 ^d	1,535	9,353	1,500 ^b	3,957	2,116	3,367	2,561	4,418
Tutuksuk River	10,841 ^d	670	2,685		1,383	169	823 ^b	159	3,000 ^b
Kobuk River System Total	38,835^c	8,940	28,032	11,480	8,164	8,112^c	13,306	16,934	2,000^b

(continued)

Appendix Table C8. (p. 2 of 4)

Stream	1971	1972 ^b	1973 ^b	1974	1975	1976	1977 ^b	1978	1979	1980
Noatak Drainage										
Noatak River below Kelly River	41,056	64,315	32,144	129,640	96,509	44,574	11,221	37,817	15,721 ^b	164,474
Eli River		3,286		22,249	1,302	1,205	742	5,525	1,794	10,277
Kelly River & Lake			2,590 ^f	1,381 ^f	3,937	217 ^b	290 ^b	168 ^b	3,200 ^b	7,416
Noatak River System Total	41,056	64,315 ^b	34,734	153,270	101,748	45,996	12,253 ^b	43,510	20,715	182,167
Kobuk Drainage										
Kobuk to Pah River	4,953			2,255	1,873	485		269	75	1,694
Pah River to just below Selby River	2,039	1,865		4,710	3,968	2,037		1,448	183	2,069
Selby River mouth & slough	3,490	7,400		7,380				211	1,110	
Selby R. mouth to Beaver C.	4,720	3,170	920	13,775 [*]	4,861 [*]			53	640	6,925 ^d
Beaver Creek mouth	2,000	3,000	850							784
Above Beaver Creek		2,720	700							
Upper Kobuk River Total	17,202	18,155	2,470 ^b	28,120	10,702	2,522 ^b		1,981 ^b	2,008	11,472
Squirrel River	6,628	32,126	12,345	32,523	32,256	7,229	1,964 ^b	1,863 ^b	1,500 ^b	13,563
Salmon River	5,453	2,073 ^b	6,891	29,190	9,721	1,161		814 ^b	674 ^b	8,456
Tutuksuk River	1,384 ^f			8,312	1,344 ^b	758		368 ^b	382 ^b	1,165
Kobuk River System Total	30,667	52,354	21,706	98,145	54,023	11,670	1,964	5,026	4,564	34,656

(continued)

Stream	1981 ^b	1982 ^b	1983	1984	1985 ^b	1986 ^b	1987 ^b	1988 ^b	1989 ⁱ	1990 ^b
Noatak Drainage										
Noatak River below Kelly River	116,352	20,682	79,773	67,873	45,525	37,227	5,515 ^{bj}	45,930 ^{bj}		23,345 ^b
Eli River		189	3,044	5,027	855	4,308	2,780	8,639		3,000
Kelly River & Lake	13,770	11,604	12,137	3,499	1,200	839	950	1,460		325 ⁱ
Noatak River System Total	130,122	32,475	94,954	76,399	47,580	42,374	9,245	56,029		26,670
Kobuk Drainage										
Kobuk to Pah River	18	2,643 ^b	2,147	402	2,048 ⁱ	531				4,610
Pah River to just below Selby River	309	598 ^b	2,433	257	241 ⁱ	511	2,250	1,135 ^b		305
Selby River mouth & slough	8,321 ^{da}	2,454	11,683		711 ⁱ	673	1,470	820 ^b		420
Selby R. mouth to Beaver C.		7,268	13,011	5,910	3,278 ⁱ	3,282	1,350	6,890 ^b		7,505
Beaver Creek mouth		1,711	3,059							
Above Beaver Creek			1,413	4,052		1,018	3,140	3,050 ^b		2,515
Upper Kobuk River Total	8,648	14,674	33,746	10,621	6,278	6,015	8,210	11,895^b		15,355
Squirrel River	9,854	7,690	5,115	5,473	6,160	4,982	2,708 ^c	4,848 ^b		5,500
Salmon River	4,709	1,821 ^c	1,677	1,471	2,884	1,971	3,333	6,208		6,335
Tutuksuk River	1,114	1,322	2,637	1,132	5,098	4,257	206	3,122		2,275
Kobuk River System Total	24,325	25,507	43,175	18,697	20,420	17,225	14,457	26,073		29,465

(continued)

Appendix Table C8. (p. 4 of 4)

Stream	1991	1992 ^b	1993	1994 ⁱ	1995	1996	1997	1998	1999	Aerial Escapement Goals
Noatak Drainage										
Noatak River below Kelly River	82,750	34,335	25,415		147,260	306,900	ⁱ	^b		
Eli River	2,940	701	4,795		7,860	30,040	ⁱ	^b		
Kelly River & Lake	654	726	9		8,384	1,427	2,792	2,631		
Noatak River System Total	86,344	35,762	30,219		163,504	338,367		^b	84,085	84,000
Kobuk Drainage										
Kobuk to Pah River	9,840	1,030	3,896		12,190	20,700	2,248 ^b	^b		
Pah River to just below Selby River	2,780	3,820	1,535		4,537	4,600	404 ^b	^b		
Selby River mouth & slough	1,040	1,500	1,800		1,250	4,100	662 ^b	^b		
Selby River	1,460	868	824		3364	14,950	853 ^b	730		
Selby R. mouth to Beaver C.	5,250	3,845	929		10,898	15,480	2,582 ^b	^b		
Beaver Creek mouth							914 ^b	^b		
Above Beaver Creek	4,155	740	3,174		3,486	14,940	850 ^b	^b		
							^b	^b		
Upper Kobuk River Total	24,525	11,803	12,158		35,725	74,770	8,513 ^b	^b	27,340	10,000
Squirrel River	4,606	2,765	4,463		10,605	10,740	4,779 ^b	^b	13,513	11,500
Salmon River	5,845	1,345	13,880		13,988	23,790	1,181 ^b	^b	4,989	7,000
Tutuksuk River	744	1,162	1,196		3,901	21,805	163 ^b	^b	2,906	2,000
Kobuk River System Total	35,720	17,075	31,697		64,219	131,105			48,748	30,500

^a Three aerial surveys are attempted yearly at different intervals for each tributary to assess escapements prior to the peak, at the peak and after the peak of the run. Indices listed in this table are the largest survey observed for each tributary during the given year.

^b Poor survey conditions or incomplete, early or late survey.

^c Survey by foot or boat.

^d These fish are unidentified salmon, mostly chums.

^e This figure includes fish observed from just above Selby Slough to the mouth of the Reed River.

^f Unresolvable discrepancies in historical data put this figure in question.

^g Unclear where these fish were observed.

^h The figures in this table have been corrected and supercede figures in previous reports.

ⁱ Surveyed well before peak of migration.

^j Unacceptable conditions.

Section 2: PACIFIC HERRING

(Includes Norton Sound and
Port Clarence/Kotzebue Districts)

SECTION 2 - PACIFIC HERRING

INTRODUCTION

Boundaries

The Norton Sound District consists of all waters of Alaska between the latitude of the western most tip of Cape Douglas and the latitude of Canal Point Light (Figure 8). The Port Clarence District consists of all waters of Alaska between the latitude of Cape Douglas and the latitude of Cape Prince of Wales. The Kotzebue Sound District consists of all waters of Alaska between the latitude of Cape Prince of Wales and the latitude of Point Hope (Figure 9).

Spawning Areas and Timing

The arrival of Pacific herring (*Clupea harengus pallasii*) on the spawning grounds is greatly influenced by climate and oceanic conditions, particularly the extent and distribution of the Bering Sea ice pack. Most herring spawning populations appear near the eastern Bering Sea coast immediately after ice breakup between mid-May and mid-June. Spawning progresses in a northerly direction and may continue into July or August along portions of the Seward Peninsula or within the Chukchi Sea.

The primary spawning areas within Norton Sound have been from Stuart Island to Tolstoi Point. When sea ice has remained in this area into June, spawning has been more extensive along Cape Denbigh and several locations along the northern shore of Norton Sound between Bald Head and Bluff. More northerly spawning areas have been more difficult to identify due to small herring stock sizes and limited investigations. Likely spawning areas include Imuruk Basin, Shishmaref Inlet, Deering-Kiwalik coast, and Hotham Inlet.

NORTON SOUND DISTRICT

Fishing History

Pacific herring have been utilized for subsistence purposes by coastal residents prior to the mid-1800's when their use was first documented by early explorers. The earliest American commercial effort on Bering Sea herring apparently took place in the early part of this century at Golovin Bay in Norton Sound (Appendix Table D1).

Food Herring

Early records indicate that about 3,200 short tons of "fall herring" were processed in Norton Sound from 1916 to 1941 (Appendix Table D1). This fishery was dependent on salt curing and declined because of poor marketing conditions arising from foreign competition. The Japanese began gillnetting in Norton Sound during 1968 with three vessels. Effort was concentrated about 12 miles offshore between St. Michael and Golovin. Approximately 40 Japanese vessels reported harvesting a record 1,400 short tons (st) of herring during 1969 (Appendix Table D2). An average annual harvest of approximately 440 st was reported in Norton Sound by the Japanese during 1968-1974. The Japanese gillnet fishery was prohibited in 1977.

Sac Roe

Domestic commercial fishing resumed in Norton Sound in 1964 near Unalakleet and continued on a sporadic basis until 1979. Between 1964 and 1978 the fishery averaged about 14 short tons of herring annually and targeted on "spring herring" for sac roe extraction (Appendix Table D1). In 1979, a domestic herring fishery for sac roe began on a larger scale in Norton Sound when approximately 1,292 short tons (st) of herring were taken by 63 fishermen (13 purse seiners, 50 gillnetters). Purse seiners took 70% of the total catch.

After the 1979 season, the Alaska Board of Fisheries adopted a public proposal which made gillnets and beach seines the only legal commercial herring fishing gear within Norton Sound. A purse seine fishery could only be opened if the gillnet fleet could not take the allowable harvest. This regulation was an attempt to encourage involvement of local fishermen in this developing fishery. During the 1980 season, 294 gillnet fishermen harvested 2,452 short tons of herring (Appendix Table D3). Because gillnet fishermen demonstrated that they were capable of taking the available harvest, a regulation was passed in 1981 which prohibited any purse seine gear within Norton Sound.

Prior to the 1984 season, the harvest by beach seine fishermen was negligible. During 1984, ten beach seine fishermen harvested 327 st. During their 1984 fall meeting, the Board of Fisheries set a beach seine gear limit of 100 fathoms and limited the harvest to "not exceed 10 percent of the total herring sac roe harvest projection as published by the department." During the fall 1987 Board of Fisheries meetings, beach seine gear was further restricted to a limit of 75 fathoms. Beach seine harvests since 1985 have averaged 6.3% of the total reported harvest.

As with any developing fishery, fishing effort increased with each successive season. In 1984 Norton Sound became a Super-Exclusive Use herring fishing district in order to slow growth and bolster local involvement, but with only limited success. The 1987 season had the highest level of fishing effort on record with a total of 564 fishermen making at least one delivery, where 559 gillnet and 22 beach seine permits recorded landings. This was more

than twice the average effort from 1980 through 1986. Local Norton Sound area residents accounted for only 36% of the effort and 29% of the total harvest.

A public proposal to the fall 1987 Board of Fish was adopted that changed the Norton Sound Herring Fishing District to Limited Entry status. Beginning with the 1988 season, a moratorium was placed on Norton Sound where no new entrants were allowed into the fishery. The Limited Entry Commission is reviewing and awarding limited entry permits to fishermen based on fishing history and will eventually reduce the total number to 301 gillnet and 4 beach seine permits as directed by the Board of Fisheries. Currently, most fishermen have already received limited entry permits and others are still fishing with interim-use permits while their eligibility is being evaluated on a case-by-case basis.

Commercial harvests from 1981-1984 averaged 4,137 st, and ranged from a low of 3,662 st in 1984 to 4,582 st in 1983 (Appendix Table D3). From 1985-1988, commercial herring harvests averaged 4,374 st, ranging from a low of 3,548 st in 1985 to a high of 5,194 st in 1986. From 1989-1991, harvests averaged 5,596 st, ranging from 4,743 st in 1989 to 6,373 st in 1990. No Fishery occurred in 1992 because of a very late ice breakup in Norton Sound. Low prices and declining market conditions resulted in a below average harvest in 1994. More recently, the harvest has averaged 4,899 st from 1995 to 1998. Stock status, market conditions and climatic factors influence level of commercial harvest.

Spawn on Kelp

A small-scale spawn-on-kelp (*Fucus*) fishery existed in Norton Sound from 1977 to 1984. Harvests during the 1977-1984 period ranged from less than one ton (1977) to approximately 46 st (1981). In addition, during the 1984 season, one ton of macrocystis kelp was imported into Norton Sound resulting in a harvest of approximately 3 st of product. In response to a public proposal, a Board of Fisheries action prior to the 1985 season resulted in the closure of all spawn-on-kelp fisheries in Norton Sound.

The 1998 herring market was known to be poor before the southernmost fisheries opened. The Alaska Board of Fisheries approved an experimental herring spawn on *Macrocystis* kelp fishery to operate in Norton Sound during the 1998 season. The Commissioner approved emergency regulations to allow a herring spawn wild *Fucus* kelp fishery shortly before the normal start of the sac roe fishery. The intent of these decisions was to allow as much opportunity as possible to sac roe permit holders, since there would be an opportunity for only a small minority to participate in the sac roe fishery. At their January 1999 meeting, the Board of Fisheries instituted a *Macrocystis* kelp fishery and allowed for a wild *Fucus* spawn on kelp fishery for sac roe permit holders who had not sold sac roe product. The wild *Fucus* harvest would be limited to that area west of Wood Point to Canal Point Light, including Stuart Island.

Management Strategies

The overall statewide management strategy is to annually harvest 0-20% of the herring biomass. The upper end of the exploitation range is applied to stocks in good condition. The lower end of the exploitation range is applied to stocks that are exhibiting a trend of decreasing abundance and poor recruitment. If a minimum threshold level is not achieved, 7,000st for Norton Sound, no commercial fishery will be allowed.

Typically herring are long lived fish and will usually remain harvestable for at least five years after recruiting into the fishery. Harvesting only a percentage of the biomass ensures that some fish will be held over for following years. This type of strategy helps mitigate population fluctuations caused by successive years of poor recruitment, a common occurrence in marine spawning fish. Prior to 1983, harvests in Norton Sound were regulated on a subdistrict basis so harvests would be dispersed over the entire fishing grounds. This strategy was used to prevent harvest efforts from concentrating in one area on what was then thought to be a distinct stock of fish.

Since methods to reliably forecast herring returns are still being developed and estimates of recruitment are not available, in-season assessments of biomass supersede the projected biomass for management of the Norton Sound herring fishery. The herring biomass is managed for a 20% exploitation rate at biomass levels twice the minimum threshold or greater. Reduced harvest rates have been discussed as the biomass level approaches the threshold but the situation has never arisen. If the run does not materialize as projected, the harvest exploitation rate may be reduced to a lower level.

Generally, fisheries management staff have tried to set fisheries openings to allow gillnetters to fish the flood tide as it crests. The belief that the ripe females approach the beach at that time to spawn figures heavily in this strategy. Because the Norton Sound fishery covers a large area with varying tides, opening at the optimal time throughout the district is not always possible. The fishing fleet must be flexible to maximize catches and quality.

The duration of beach seine openings is dependent on herring abundance near the beach and favorable weather conditions for spotters and fishing. Beach seiners prefer to work flood tides similar to those gillnetters favor, however, fisheries managers frequently provide less optimal fishing times. The beach seiners have shown the ability to harvest their allotment of 10% of the preseason harvest goal in a single three hour opening under ideal conditions. By the nature of the gear, beach seiners have the potential to wrap up large numbers of fish that could potentially exceed their allocation. Therefore, the management staff have often chosen to reduce the beach seine efficiency by allowing a gillnet opening to occur before the beach seine opening in order to break up school size and reduce the likelihood of excessive harvests. Occasionally, the beach seine fleet has been used to test the roe quality of herring newly arrived in nearshore waters prior to a gillnet opening where the potential for waste would have been great had the entire gillnet fleet fished on poor quality herring.

1999 SEASON SUMMARY

The 1999 herring market was expected to be poor even before the southernmost herring fisheries opened. Low harvests and poor showings of herring brought the price up as the fisheries progressed to the Bering Sea. Still, fewer processors than usual chose to participate in the Norton Sound sac roe herring fishery. This limited the number of participants in the sac roe fishery and slowed the rate of the sac roe herring harvest.

The Alaska Board of Fisheries approved two new regulations regarding the Norton Sound herring fisheries in March of 1999. The open pound spawn on kelp fishery was transformed from a one year only provisional fishery and made an annual fishery. Likewise, the spawn on wild *Fucus* kelp fishery that was allowed by Emergency Regulation in 1998 was put into regulation. Both these fisheries require participants to own a Norton Sound sac roe permit. The intent is to allow permit holders to diversify their use of the herring resource by electing to participate in only one of the fisheries. This would allow permit holders more opportunity to participate in the fishery and to maximize their earnings by selling their product to the highest paying market.

Spawn on Kelp

Permit holders wishing to participate in the *Macrocystis* spawn on kelp open pound fishery were required to register with the Nome Fish and Game office by April 16. The increasing market for sac roe herring caused a decline in interest with the *Macrocystis* spawn on kelp fishery. Eight permit holders registered as participants in the second year of the *Macrocystis* fishery. One permit was revoked just prior to the season and another permit holder eventually chose not to deploy kelp. Of the six participants, only two actually harvested product. A late spring and the associated ice floes severely complicated the fishery. At least one kelp frame was damaged by ice and several participants found their access to spawning herring blocked by ice for several days.

Fishers harvested 7,481 pounds of spawn on *Macrocystis* kelp. Although the spawn on kelp product has been processed, the final sales of the spawn on kelp have not been completed. No value figures are available at this time.

No wild spawn on kelp harvest was taken in 1999.

Sac Roe

The 1999 Norton Sound herring sac roe fishery opened by Emergency Order on June 14 with two companies accepting herring. Sea ice delayed the arrival of two of the processors and about half of the tenders. Department test fishing and aerial observations indicated the presence of marketable quality herring on June 12. No buyers were prepared to purchase herring until June 14. The third company began buying in June 15 and the fourth company began accepting herring on June 16.

The total harvest of sac roe herring based on fish ticket data was 2,693.2 short tons (st) of herring (Table 18 and 19). In addition, 53.1 tons of bait herring were reported as well (Table 19). The tonnage in the 1999 reports is wet weight. One company chose to report in dry weights, which resulted in a 10% reduction in weight. Staff converted the reported harvest to wet weights, which have been the standard reported weight in recent years. Since 1981, catches have averaged 4,176 st.

There were 119 sac roe permit holders who made at least one delivery during the season. One beach seine permit holder was prepared to fish, but found it difficult to attract a market. By the time a tender was available for the beach seine fishery, the opportunity to harvest high quality herring had nearly past. Norton Sound residents predominated in the fishery. A small proportion of Yukon River residents participated and the remainder of the permit holders were non-local residents of Alaska and non-residents.

During the 1999 season, all successful sac roe fishermen used gill nets, landing a total of 2,693.2 st. The average sac roe recovery for gill net caught herring was 10.5 percent (Table 18 and 19).

There were 4 companies present on the grounds during the season purchasing herring. These 4 companies registered 5 processors and 13 tenders.

Based on final operations reports, it appears the average price advanced for a short ton of 10% roe herring ranged from \$200 to \$250. The average price of herring purchased as bait was \$57.27. The total value of the herring harvest to the fishermen was approximately \$614,864. These values do not include the directed bait harvest in Subdistrict 7.

Bait

A permit holder from Nome requested that a bait fishery be allowed after the sac roe fishery finished. A total of 8.3 tons of herring were landed as bait. The bait harvest was taken by a single permit holder for use in the local halibut and crab fisheries. Approximately 16,500 pounds of bait were sold at \$0.75 per pound. The value of the harvest was approximately \$12,375.

Fishery Management/Emergency Orders

Dense pack ice in the eastern Bering Sea in 1999 delayed travel for most of the processing and tender vessels traveling to Norton Sound. In mid-June the pack ice concentrated at the entrance to Norton Sound. Besides complicating surface travel, the herring migration seemed to be more drawn out than usual. The pack ice gradually dissipated from the south and west leaving southern Norton Sound ice choked to the last days of the fishery. This ice distribution caused a redistribution of spawning and herring concentration. The result was

an unusually high proportion of the harvest-taking place in Subdistrict 3. Some spawning did occur in relatively tightly packed ice. Fishing in southern Norton Sound was impossible and aerial surveys were affected. Staff allowed regular openings on a daily basis at favorable tides in the three eastern subdistricts (subdistricts 1, 2, and 3). Because of ice distribution, active fishing only occurred in Subdistrict 1 on the last three days of fishing, June 20-22.

The first confirmed sighting of herring was made on a June 9 aerial survey (Table 16). Biomass built gradually. Roe maturity tested well on the first samples and improved over the next three days. Spawn was first observed on June 12. By June 14, spawn was beginning to accumulate on *Fucus* in Subdistrict 1. The first gillnet fishery opening was announced on June 13 to occur on June 14. The portion of Subdistrict 1 west of Five-Mile Point was closed to spawn on kelp harvest to minimize gear conflicts. The imported kelp was deployed as it arrived beginning May 22. A single wild kelp opening was allowed on June 28 for 4 hours. The single participant reported the eggs were already eyed and hatched, no marketable product was found.

Catch Reporting and Enforcement

Buyers registered for the 1999 season were required to report herring purchases daily (8:30 a.m.) and three hours following the closure of each period. Daily reports were required to be called in to the Unalakleet office. In general, compliance with requested catch reports was very good. The VHF radio turned out to be the communication equipment of choice due to the range of the SSB radio equipment. Communications with the field camps was accomplished with marine VHF, SSB or by aircraft radio from the aerial survey plane.

Protection efforts in Norton Sound consisted of 2 single engine aircraft (two super cubs on wheels), and a small boat. Personnel consisted of 2 permanent, full-time Fish and Wildlife Protection officers. Three citations were issued, all relating to fishing beyond the closure of a fishing period.

Abundance and Research

Two Department field crews were operational during the 1999 season. One crew operated from Cape Denbigh and the second crew operated from Klikitarik. A third test fishing crew was based in Unalakleet. The test fish crew's presence and sampling efforts on the herring grounds are critical to the proper management of the fishery and collection of biological information of the stocks.

Unalakleet field office personnel during the season consisted of the area management biologist, the Norton Sound and Kotzebue assistant area management biologists, the catch monitor, and one biometrician from the Anchorage Regional office. Norton Sound Economic Development Corporation supplied two fishery interns to assist ADF&G in test fishing and sampling during the herring fishery.

Test fish crews sampled 2,525 herring caught with variable-mesh gillnets from May 31 through June 24 for biological data. Age 9+ herring dominated the return in biomass (Figures 11 and 12). Age 6 was the largest component in numbers of fish (24.1%). The biomass consisted of 64.1% age 9 and older herring. Recruit herring represented 9.3% of the return in numbers of fish.

Biomass Determination

A complete listing of the aerial surveys flown in Norton Sound and number and length of spawn are found in Tables 16 and 17. The peak aerial survey count was made on June 19. Because of the ice distribution, the staff believes a significant portion of the biomass held in deep water and did not migrate to the *Fucus* beds of southern Norton Sound until June 24 as the sea ice finally dissipated. To account for the unusual migration of the herring the peak aerial survey of Subdistrict 1 from June 24 was combined with the peak aerial survey observations of the other subdistricts from June 19. These observations combined with the harvests up to June 19 provide a biomass estimate of 34,314 tons.

2000 Outlook

The biomass projected to return to Norton Sound in year 2000 is 26,924 tons (DuBois and Hamner, 1999). A 20% exploitation rate would result in a harvest of 5,385 tons. Inseason assessment of herring biomass will supersede projected biomass for management of the Norton Sound herring fishery, except where weather prevents obtaining an inseason estimate. The beach seine harvest is, by regulation, 10% of the projected harvest, or 538 tons.

The year 2000 herring fishery will be opened by emergency order. The fishery will close by emergency order when up to 20% of the available herring biomass has been harvested. Varied harvest rates may be applied to individual subdistricts based on biomass distribution, roe quality, weather, and sea ice conditions.

Ages 7, 12 and 9 are expected to comprise well over one-half the returning biomass (23.3%, 22.1% and 13%, respectively). Age 9 and older herring are expected to contribute over two-thirds of the return.

Table 13. Daily observed peak biomass estimates of Pacific herring, Norton Sound District, 1999.

Date	Flight No.	Observer Initials	Survey		Spawn		Estimated Biomass (ST) By Subdistrict							
			Hours	Rating	No.	Length (mi)	KLK	UNK	CDB	NTB	ELM	GOL	NOM	TOTAL
5/27/99	1	FB/TK	1.3	Ice	0	0.0	0.0	0.0	0.0					0.0
5/31/99	2	FB/TK	1.4	Ice	0	0.0	0.0	0.0	0.0					0.0
6/1/99	3	TK	1.4	Ice	0	0.0	0.0	0.0						0.0
6/4/99	4	TK/CL	2.0	Ice	0	0.0	0.0	0.0	0.0					0.0
6/8/99	5	FB/TK	0.9	0.5	0	0.0		0.0	1109.0					1109.0
6/9/99	6	CL	2.0	2	0	0.0	3.0	129.0	3035.8					3167.8
6/10/99	7 ^a	CL	3.0	2	0	0.0	91.2	1715.2	3133.1	Ice				4939.5
6/10/99	7 ^b	TK		2	0	0.0	289.4	1331.0	3056.8					4677.2
6/11/99	8 ^a	CL	3.0	2	0	0.0	1884.6	2024.9	2751.5					6661.0
	8 ^b	TK		2			2255.2	1583.1	1723.4					5561.7
6/12/99	9	FB	4.0	5	5	0.6	1198.0	1748.0	1651.0	0.0	241.0	0.0	0.0	4838.0
6/13/99	10	CL	2.8	4	11	1.8	560.8	280.2						841.0
6/14/99	11 ^a	FB	4.5	4	47	1.3	952.5	594.2	11379.8	35.9	1354.9	624.9		14942.2
	11 ^b	TK					2443.1	1563.3	13111.6	63.6	3389.1	573.9		21144.6
6/15/99	12 ^a	CL	4.5	3	64	2.7	385.0	183.6	398.7	0.0	136.8	655.2	1535.5	3294.8
	12 ^b	TK	4.5	3	43	3.4	774.0	289.9	289.4	43.5	179.7	787.2	1075.1	3438.8
6/16/99	13 ^a	CL	3.0	4	63	2.2	203.9	480.2	1666.4					2350.5
	13 ^b	FB	3.0	4	60	1.4	495.2	85.1	1435.5					2015.8
6/17/99	14 ^a	FB	4.5	3	74	5.3	1094.2	1265.2	4435.1	147.7	1830.5	1348.2	1178.0	11298.9
	14 ^b	TK	4.5	3	29	4.2	1027.9	1234.1	2462.6	571.2	1863.8	1136.2	1213.5	9509.3
6/18/99	15 ^a	CL	2.5	3	45	1.6	599.5	5399.3	5677.9					11676.7
	15 ^b	TK	2.5	3	31	2.1	542.3	1904.0	4500.1					6946.4
6/19/99	16 ^a	CL	6.7	2	20	0.8	735.8	5321.5	9638.1	81.5	991.6	548.3	749.0	18065.8
	16 ^b	FB	6.7	3	33	1.5	821.1	3151.7	3613.8	61.7	1653.5	779.5	823.5	10904.8
6/22/99	17 ^a	FB	3.0	4	94	5.0	12799.2	891.3	404.9					14095.4
	17 ^b	TK			38	3.0	15104.0	776.9	545.7					16426.6
6/24/99	18	FB	3.3	3	24	1.5	14235.2	133.1	2034.8	239.8	434.1	1780.7	554.8	19412.5
6/25/99	19	CL	4.5	3	17	0.4	4917.6	7947.5	18.2	0.0	76.0	138.0	780.3	13877.6
Sum	-	-	79.5	3	464.0	23.2	14235.2	5321.5	Waste= 5.0 9638.1	81.5	Harvest= 2743.7 991.6	1297.3	Total Harvest Survey Biomass	2748.7 31565.2 34313.9
													% Exploit	8.01%

^a Primary aerial surveyor, observation used in biomass estimate.^b Secondary aerial surveyor, observation not used in biomass estimate.^c Biomass includes combined Total Harvest, Waste, and Peak Survey Estimate.

Table 14. Norton Sound herring spawn estimates by subdistrict (s.d.), 1999.

Date	s.d. 1		s.d. 2		s.d. 3		s.d. 4		s.d. 5		s.d. 6		s.d. 7		Totals	
	#	Miles	#	Miles	#	Miles	#	Miles	#	Miles	#	Miles	#	Miles	#	Miles
5/27	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5/31	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/10	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/11	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/12	3	0.4	0	0.0	1	0.2	0	0.0	1	0.0	0	0.0	0	0.0	5	0.6
6/13	11	1.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	11	1.8
6/14	38	1.1	0	0.0	2	0.0	2	0.0	2	0.1	3	0.0	0	0.0	47	1.2
6/15	38	1.8	0	0.0	2	0.2	1	0.1	2	0.2	1	0.0	20	0.4	64	2.7
6/16	60	1.6	0	0.0	3	0.6	0	0.0	0	0.0	0	0.0	0	0.0	63	2.2
6/17	61	4.4	0	0.0	4	0.6	0	0.0	1	0.0	6	0.2	2	0.1	74	5.3
6/18	40	1.6	0	0.0	5	0.0	0	0.0	0	0.0	0	0.0	0	0.0	45	1.6
6/19	18	0.8	0	0.0	2	0.0	0	0.0	0	0.0	0	0.0	0	0.0	20	0.8
6/22	89	4.8	0	0.0	5	0.2	0	0.0	0	0.0	0	0.0	0	0.0	94	5.0
6/23	20	1.2	2	0.0	2	0.3	0	0.0	0	0.0	0	0.0	0	0.0	24	1.5
6/25	11	0.3	0	0.0	6	0.1	0	0.0	0	0.0	0	0.0	0	0.0	17	0.4
	389	19.8	2	0.0	32	2.2	3	0.1	6	0.3	10	0.2	22	0.5	464	23.1

Table 15. Sac roe herring harvest and effort by date and subdistrict, Norton Sound District, 1999.^{ab}

<u>Subdistrict 1 (333-70)</u>				<u>Subdistrict 2 (333-72)</u>			<u>Subdistrict 3 (333-74)</u>			<u>Combined Totals</u>		
Date	Number Fishermen	Daily Catch (st)	Daily Roe %	Number Fishermen	Daily Catch (st)	Daily Roe %	Number Fishermen	Daily Catch (st)	Daily Roe %	Number Fishermen	Daily Catch (st)	Daily Roe %
6/14							52	314.9	10.0	52	314.9	10.0
6/15							53	181.0	9.7	53	181.0	9.8
6/16							63	446.3	9.9	63	446.3	9.8
6/17				38	264.9	10.9	74	342.1	10.6	102	607.0	10.7
6/18							62	465.9	9.9	62	465.9	10.0
6/19							26	83.7	10.5	26	83.7	10.5
6/20	20	114.1	11.7	14	58.7	11.2	37	174.8	11.9	60	347.6	11.7
6/21	27	149.6	11.9							27	149.6	11.9
6/22	10	21.5	11.8							10	21.5	11.8
Total:	36	285.1	11.8	40	323.6	10.9	100	2,008.7	10.3	119	2,693.3 ^c	10.5

^a Gillnets were the only gear used to harvest herring.

^b Sac roe harvest only, does not include bait.

^c 75.8 tons added to sac roe total due to dewatering by buyers.

Table 16. Norton Sound commercial herring harvest by statistical area, by gear type, 1999.

Stat Area	Location	Gill Net		Bait (st)	# fishers	Spawn on Kelp	
		Sac Roe (st)	Avg. Roe %			Pounds of Kelp	# fishers
333-70	Canal Point- Spruce Creek	285.1	11.8	0	36	7,481.5 ^b	2
333-72	Spruce Creek- Junction Creek	323.6	10.9	0	40		
333-74	Junction Creek- Island Point	2,008.7	10.3	41.8	100		
333-80	Rocky Point- Cape Douglas			8.3 ^a	1		
Totals		2,693.2 ^c	10.5	53.1	120	7,481.5	2

^a Bait harvest is a preliminary number.

^b *Macrocystis* kelp.

^c 75.8 tons added to sac roe total due to dewatering by buyers. 3 tons added to bait total due to dewatering by buyer.

Figure 8. The Norton Sound Herring District and subdistricts.

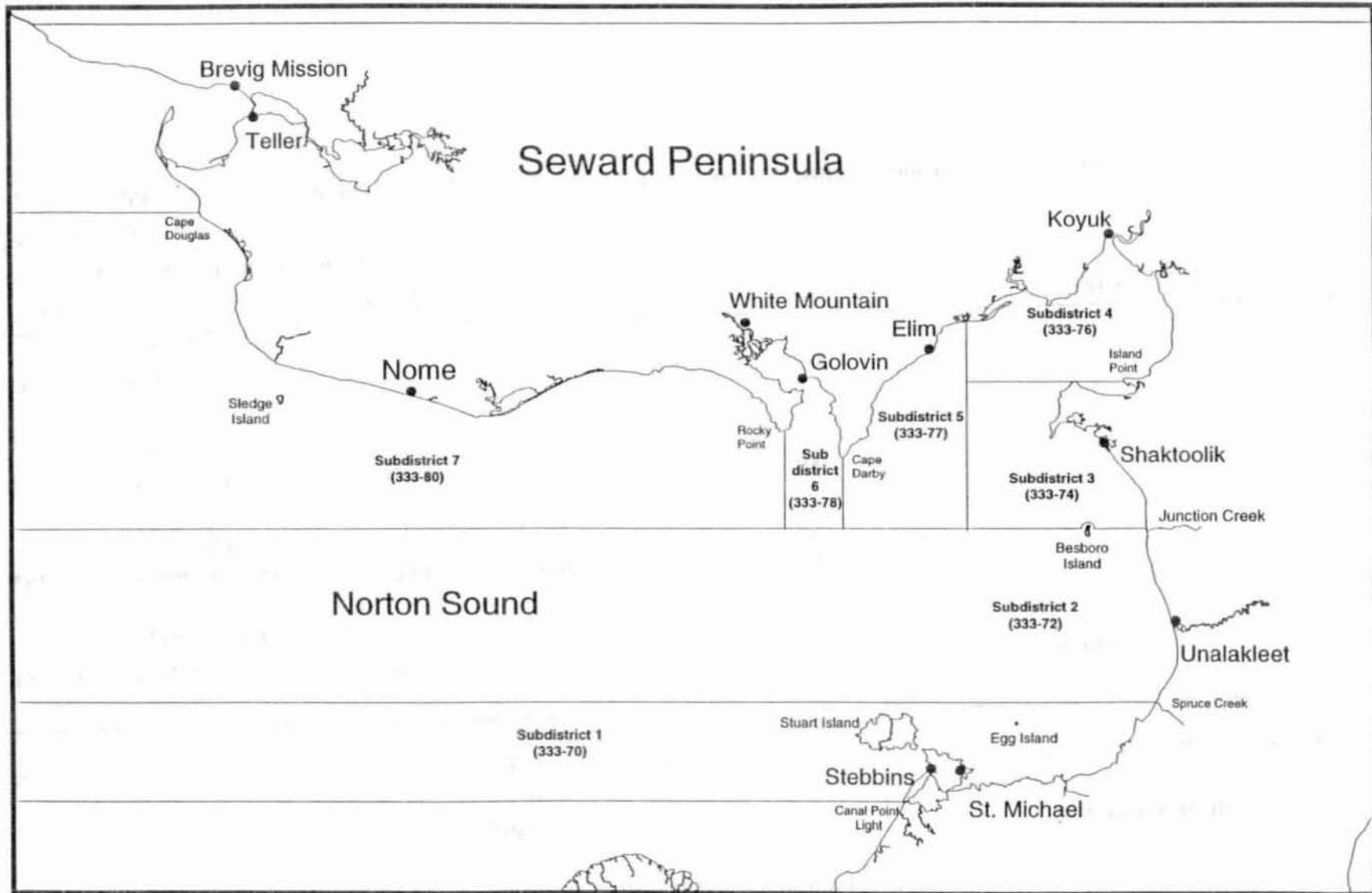
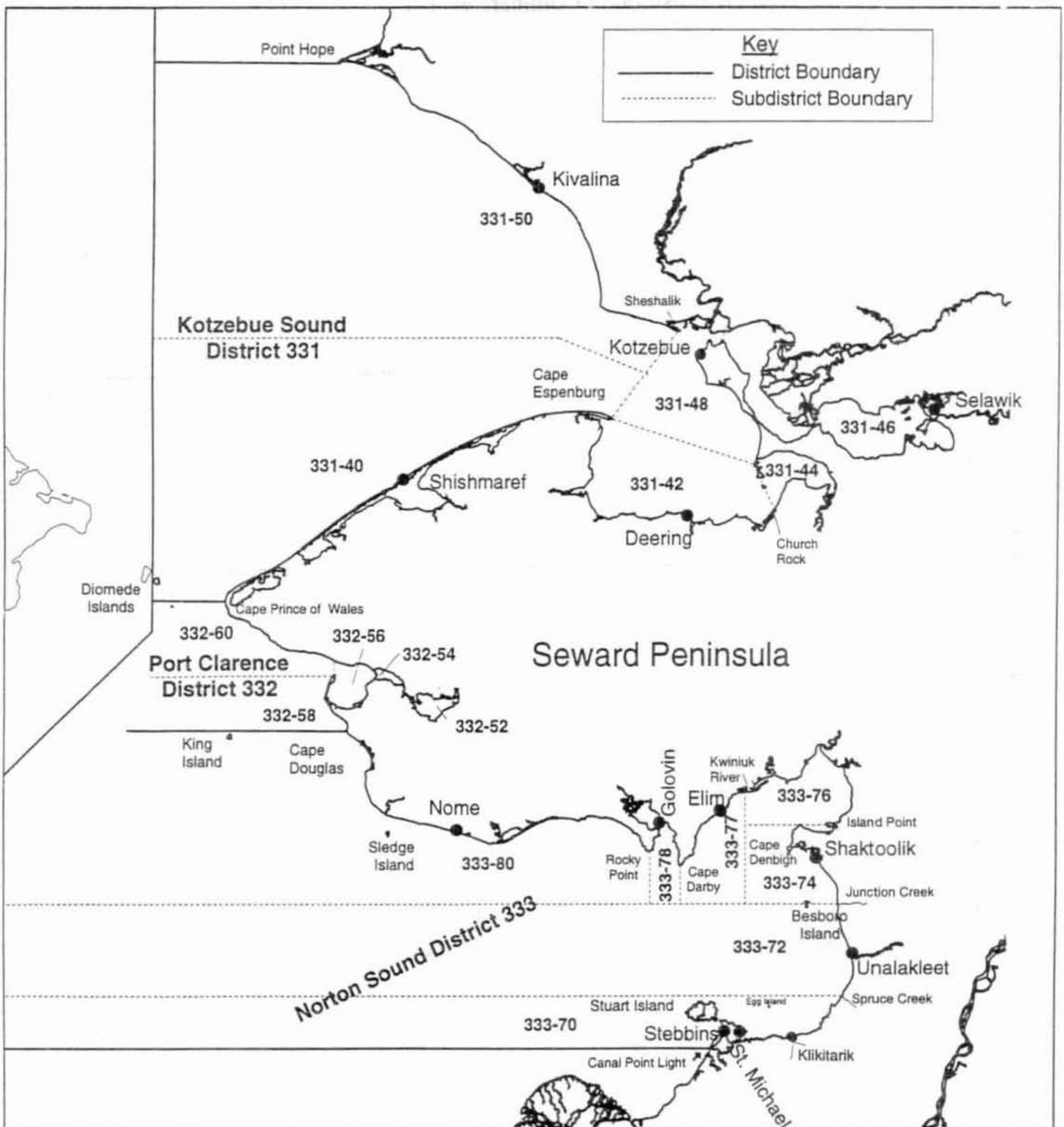


Figure 9. Statistical areas of the Norton Sound, Port Clarence and Kotzebue Sound commercial herring fishing districts.



Norton Sound District Age Composition of Commercial Gear

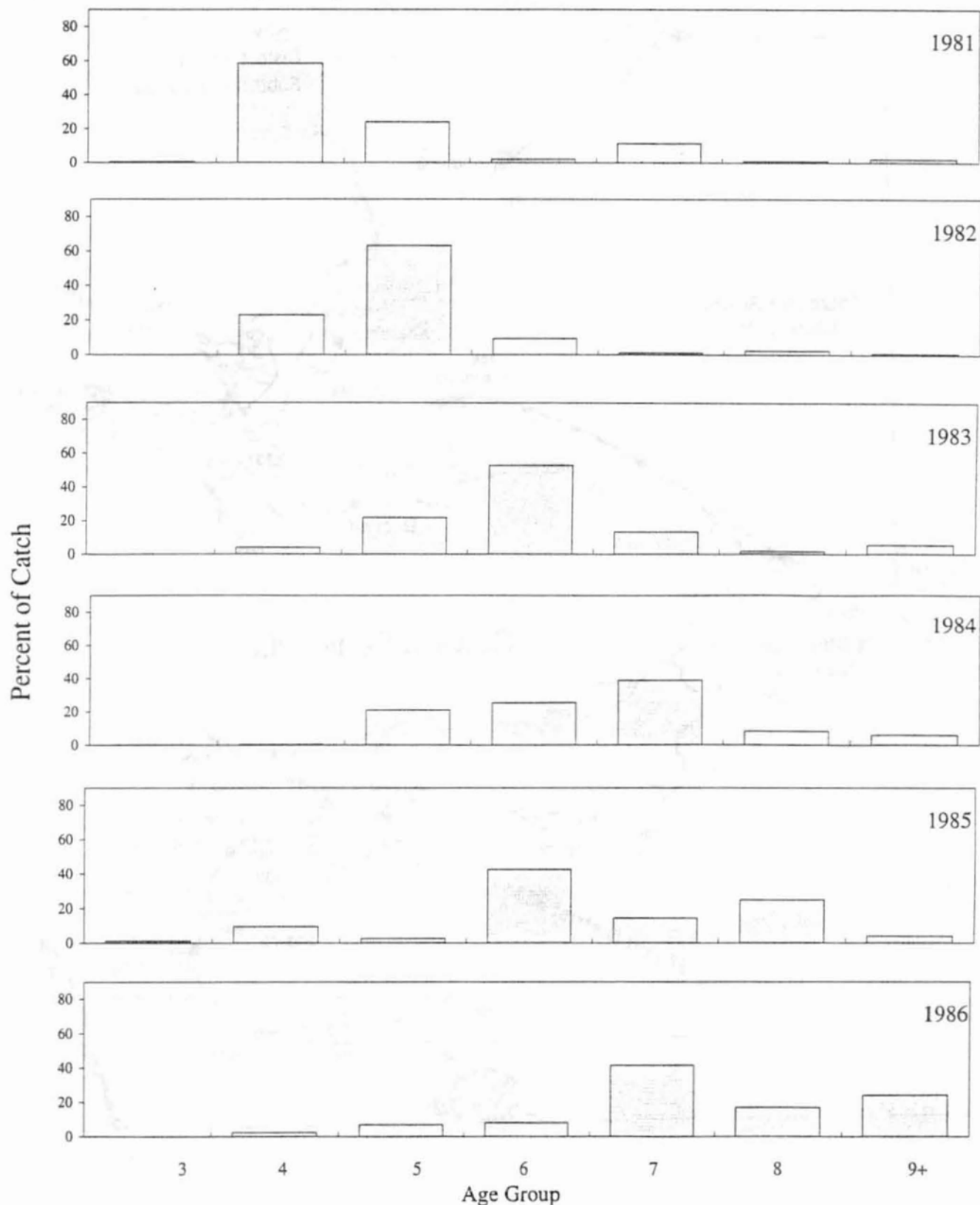


Figure 10. Norton Sound herring age class composition by percentage of commercial catch, commercial gear combined (beach seine and gill nets), 1981-1999.

Norton Sound District Age Composition of Commercial Gear Combined

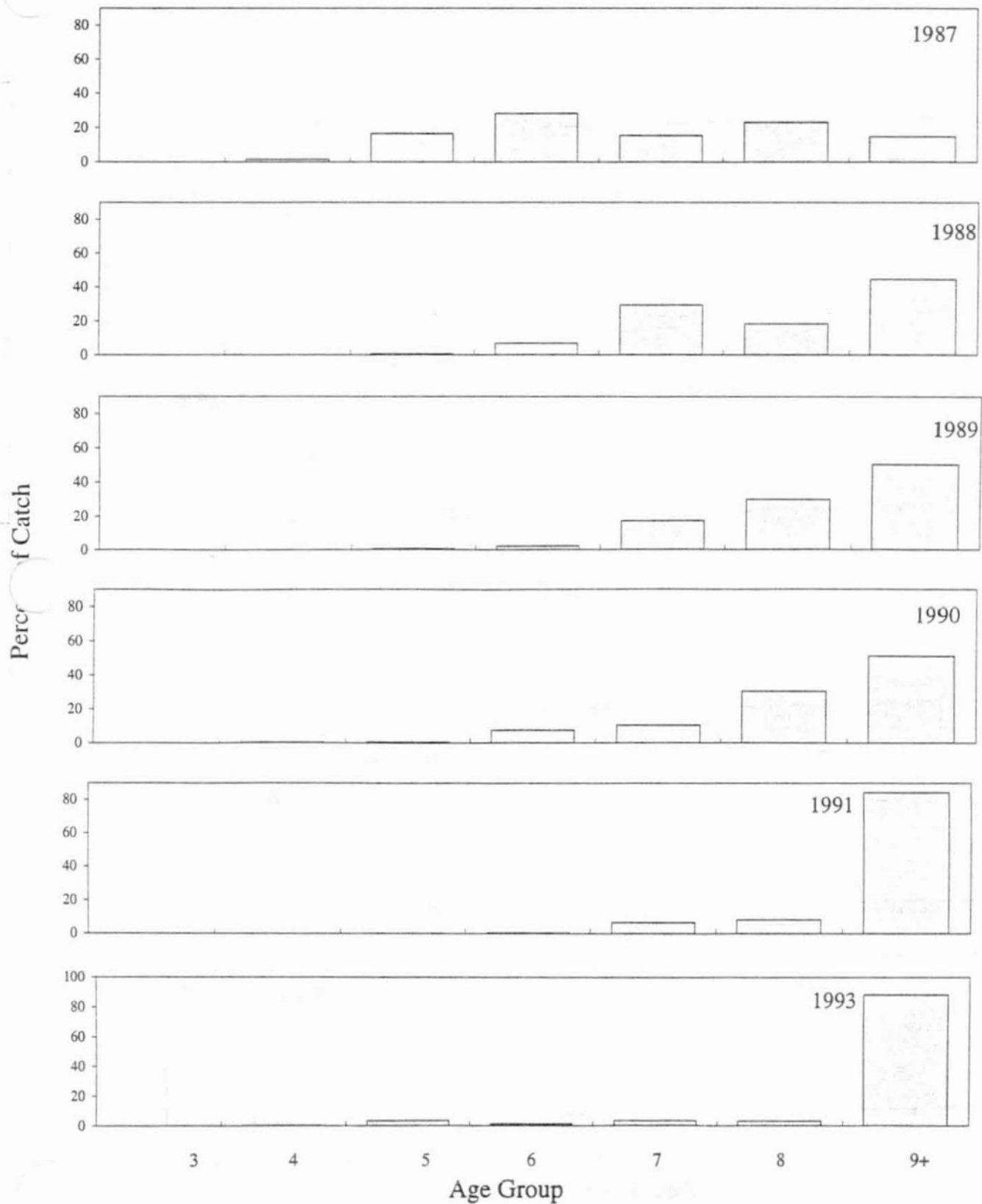


Figure 10. (page 2 of 3)
note: No commercial fishing occurred in 1992.

Norton Sound District Age Composition of Commercial Gear Combined

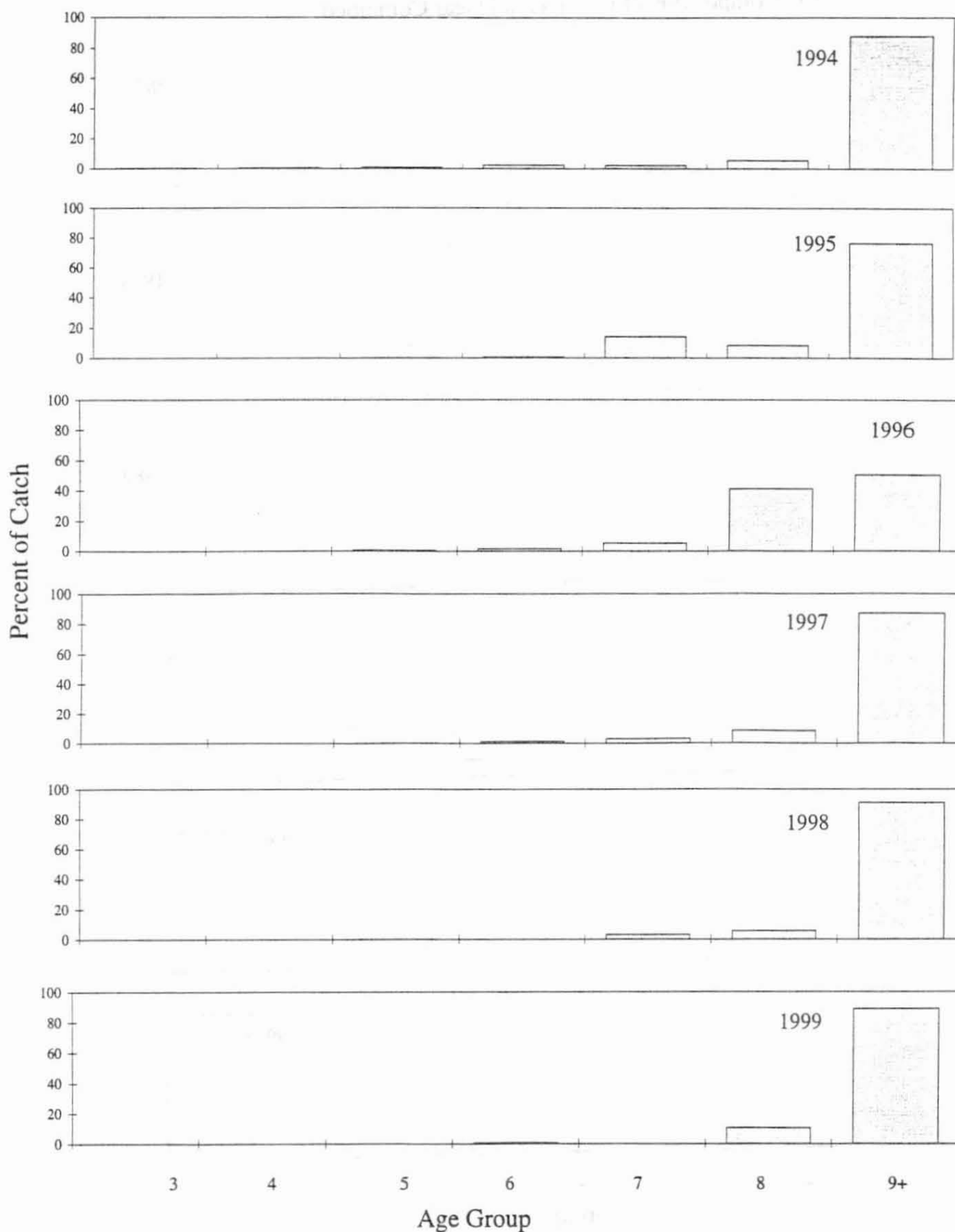


Figure 10. (page 3 of 3)

Note: No commercial catch from beach seine gear in 1998 and 1999.

Norton Sound District Age Composition of Variable Mesh Gill Nets

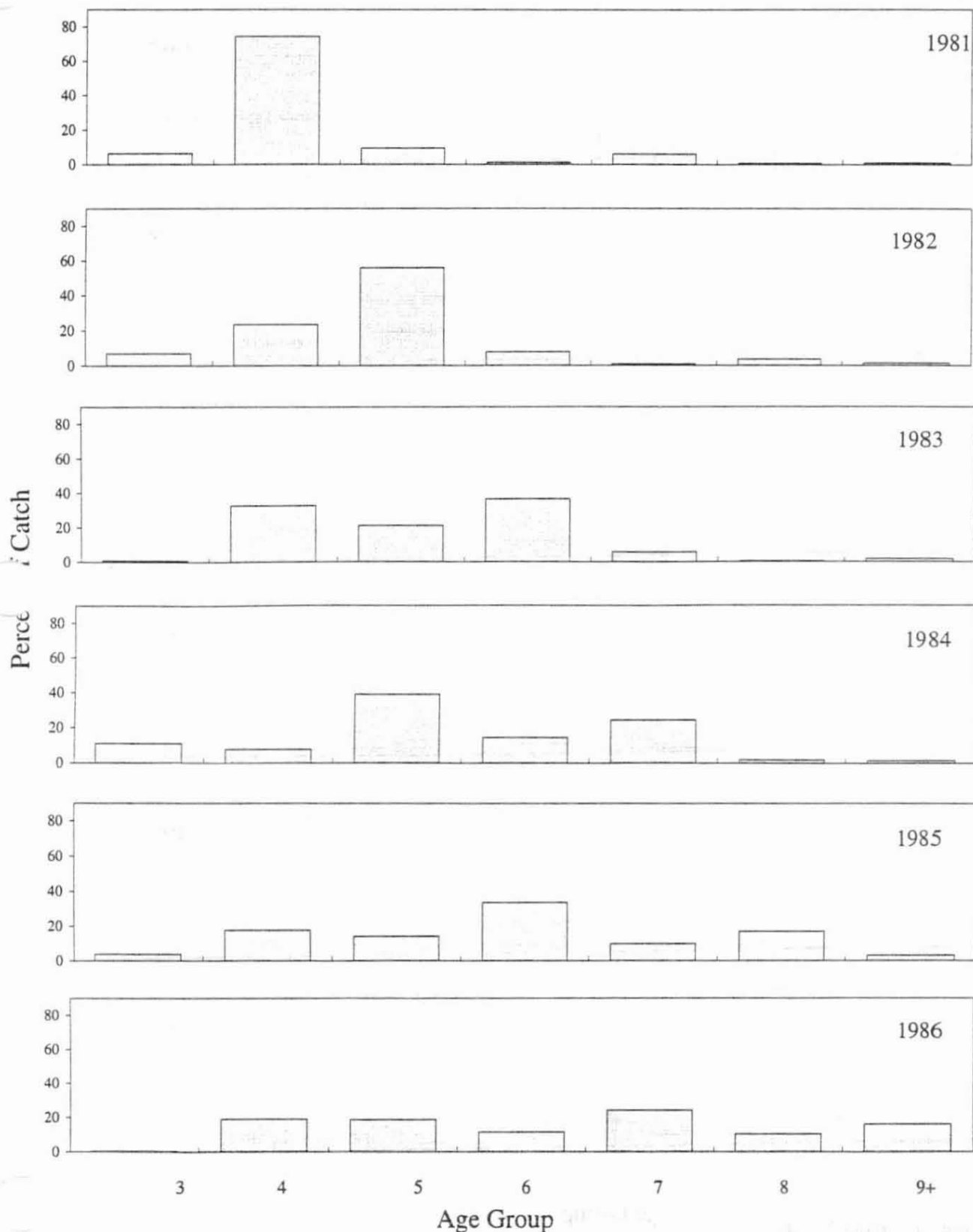


Figure 11. Norton Sound herring age class composition by percentage of total catch , variable mesh gill nets, 1981-1999. (page 1 of 4)

Norton Sound District Age Composition of Variable Mesh Gill Nets

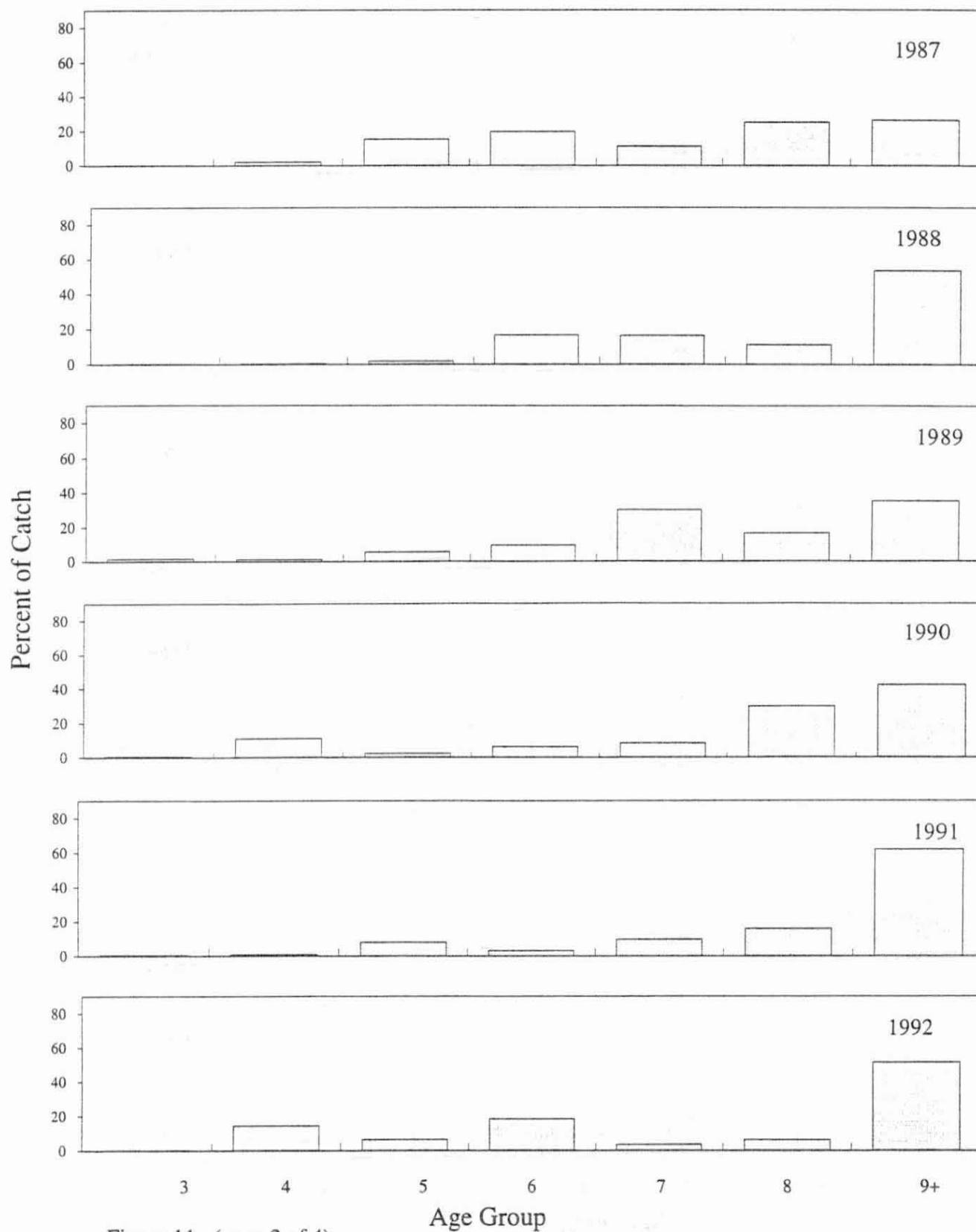


Figure 11. (page 2 of 4)

Norton Sound District Age Composition of Variable Mesh Gill Nets

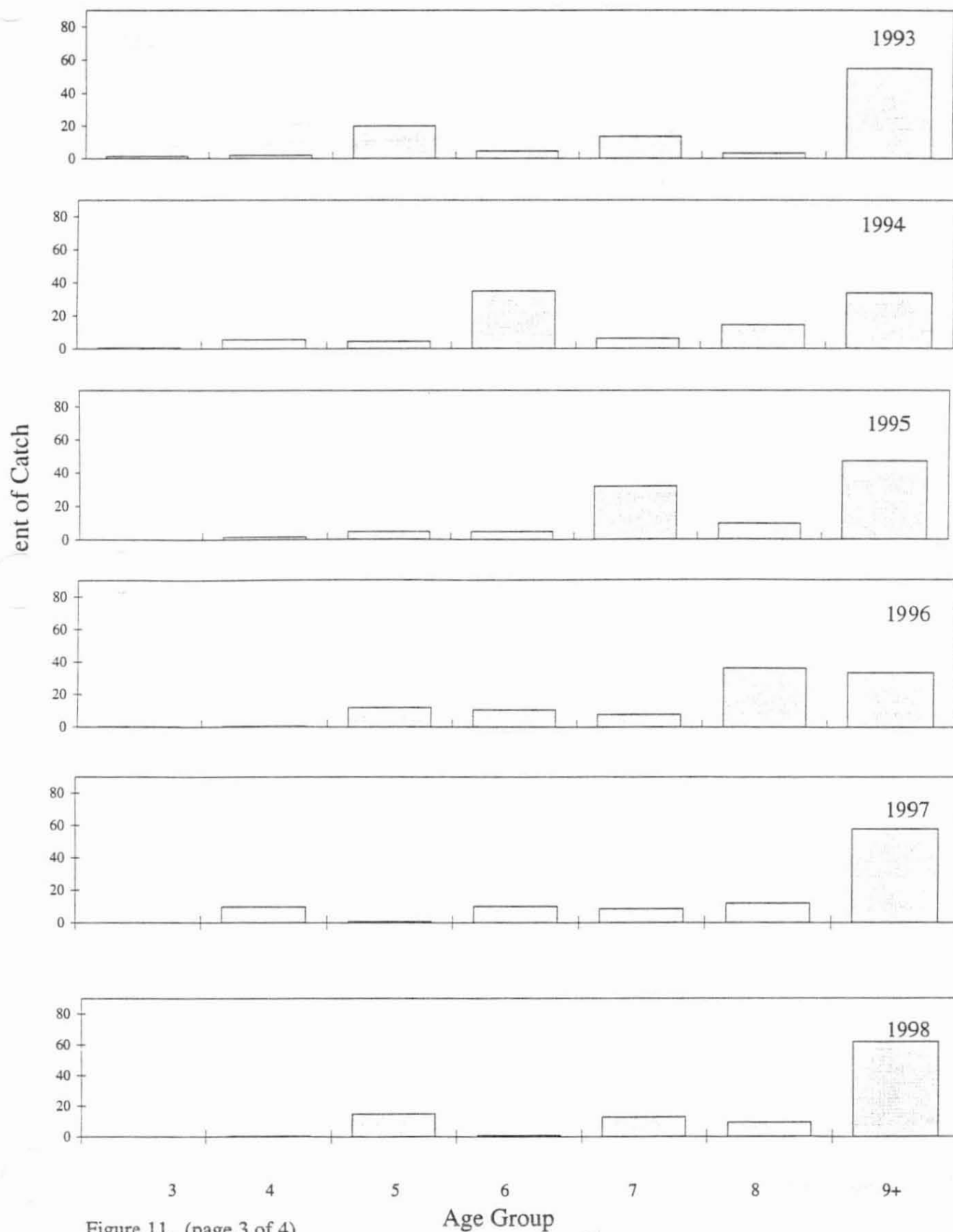


Figure 11. (page 3 of 4)

Norton Sound District
Age Composition of Variable Mesh Gill Nets

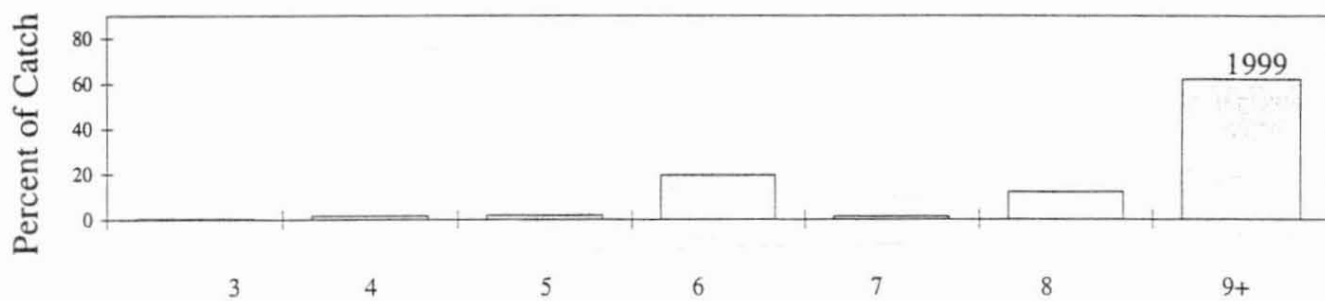


Figure 11. (page 4 of 4)

NORTON SOUND HERRING

1999 Catch and the 2000 Projection

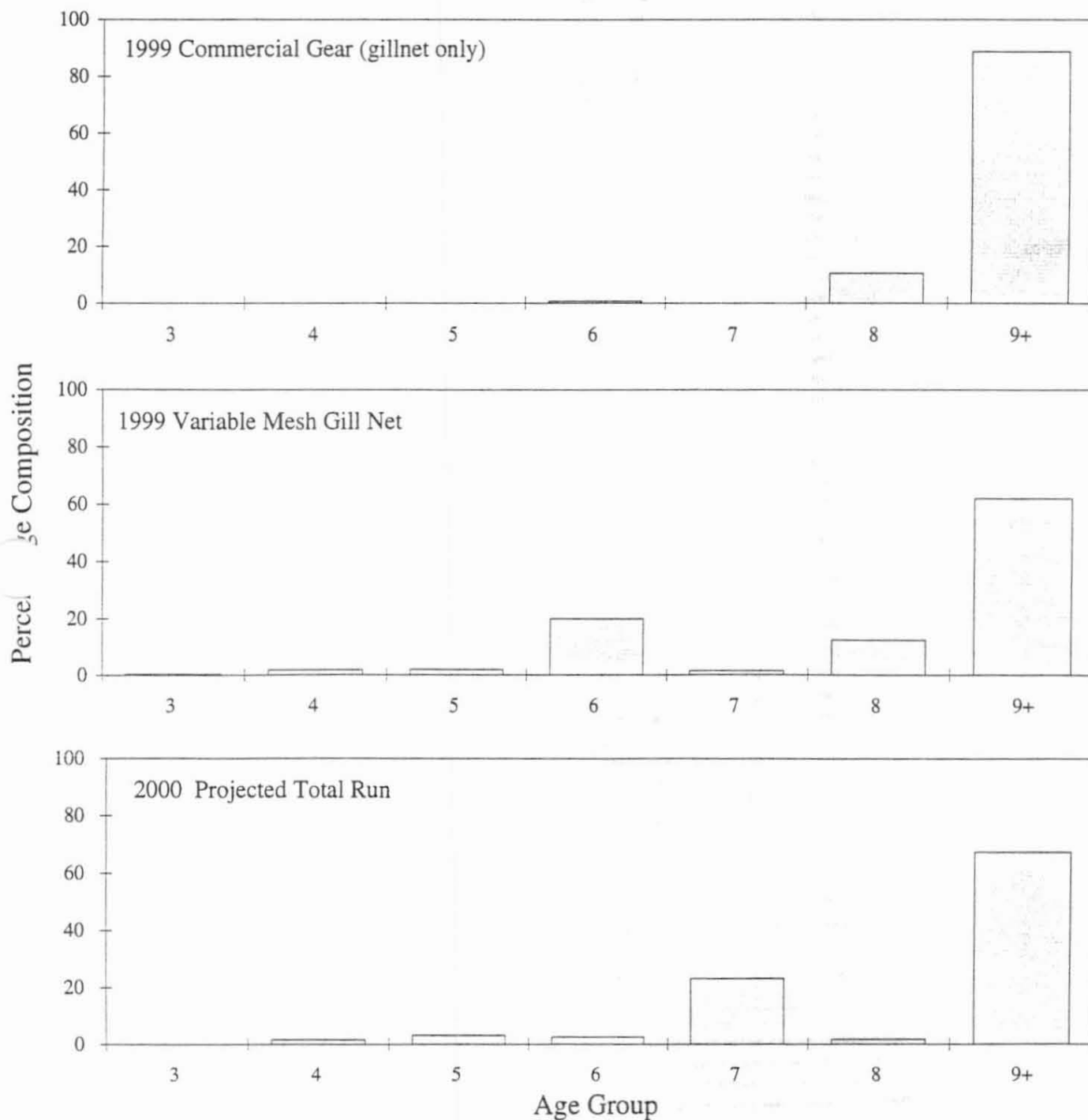


Figure 12. Norton Sound Pacific herring age composition comparison by 1999 commercial gillnet gear, variable mesh gear, and the projected age composition of the 2000 return.

Appendix Table D1. Norton Sound herring and spawn-on-kelp harvests
(in short tons) by U.S. commercial fishermen, 1909-1999.

Year	Sac Roe Herring	Food or Bait Herring	Total	Spawn on Kelp
1909-1916 ^a	-	-	-	-
1916-1928	-	1,881	1,881	-
1929	-	166	166	-
1930	-	441	441	-
1931	-	86	86	-
1932	-	529	529	-
1933	-	31	31	-
1934	-	4	4	-
1935	-	15	15	-
1936	-	-	-	-
1937	-	6	6	-
1938	-	10	10	-
1939	-	6	6	-
1940	-	14	14	-
1941	-	3	3	-
1942-1963	-	-	-	-
1964	20	-	-	-
1965	-	-	-	-
1966	12	-	-	-
1967	-	-	-	-
1968	-	-	-	-
1969	2	-	-	-
1970	8	-	-	-
1971	20	-	-	-
1972	17	-	-	-
1973	35	-	-	-
1974	2	-	-	-
1975	-	-	-	-
1976	9	-	-	-
1977	11	-	-	trace
1978	15	-	-	4
1979	1,292	-	-	13
1980	2,451	1	2,452	24
1981	4,371	-	-	47 ^b
1982	3,864	69	3,933	38
1983	4,181	401	4,582	29 ^c
1984	3,298	274	3,572	19 ^d
1985	3,420	128	3,548	- ^e
1986	4,926	268	5,194	-
1987	3,779	303	4,082	-
1988	4,256	416	4,672	-
1989	4,494	247	4,741	-
1990	5,253	1,026	6,279	-
1991	5,465	207	5,672	-
1992 ^f	-	-	-	-
1993	4,713	321	5,034	-
1994	958	2	960	-
1995	6,647	116	6,763	-
1996 ^g	6,061	109	6,220	-
1997 ^h	3,709	262	3,976	-
1998	2,623	8	2,631	9 ⁱ
1999	2,693 ^j	53	2,761	4

^a Fishery occurred some years, but harvest unavailable.

Fishery from 1909-1941 occurred near Golovin; 1964 to present has occurred in southeast Norton Sound.

^b Does not include approximately 6 st of wastage.

^c Does not include approximately 2 st of wastage.

^d Includes 3 st of spawn on *Macrocystis* kelp.

^e All spawn-on-kelp fisheries closed by regulation prior to the 1985 season.

^f No commercial fishery took place in 1992.

^g Total includes an estimate 50 st of wastage.

^h Total includes an estimate 5 st of wastage. Includes approximately 1,000 lbs taken as bait under 5 AAC 27.971.

ⁱ Includes 2,100 lbs of wild kelp and 16,083 pounds of *Macrocystis* kelp.

Appendix Table D2. Japanese gillnet herring catches in Norton Sound, 1968-1977.
(North of 63 N. Latitude and East of 167 W. Longitude)

Year	Gillnet Catch (st)	Remarks
1968	131	First foreign effort on herring in Norton Sound
1969	1,400	Peak catch with large effort (about 40 ships). Two vessels apprehended.
1970	69	
1971	703	
1972	15	
1973	38	
1974	764	
1975	-	
1976	-	Data unavailable.
1977	-	Herring fishery closed to foreign nations.
Total	3,120	Excludes 1976 catches.

Appendix Table D3. Herring biomass estimate and commercial fisheries data for the Norton Sound District, 1979 -1999.^m

Year	Biomass ^a (st)	Sac roe & Bait Harvest (st)	Kelp Harvest (pounds)	Percent ^c Exploitation	Roe % (Sac roe only)	Dollar Value (millions)	Number of Fishers
1979	7,700	1,292	26,000	16.8	7.0	0.6	67
1980	8,400 ^d	2,452	48,000	29.2	8.1	0.5	294
1981	22,360	4,371	94,000	19.5	8.8	1.5	332
1982	19,403 ^d	3,933	76,000	20.3	8.8	1.0	237
1983	26,841	4,582	58,000	17.1	8.6	1.4	272
1984	21,475	3,662 ^e	38,000	17.1	10.3	0.9	194
1985	20,000	3,548		17.7	9.9	1.4	277
1986	28,062	5,194		18.5	9.6	2.9	323
1987	32,370	4,082		12.6 ^f	8.6	2.6	564
1988	33,924	4,672		13.8 ^g	9.0	3.9	348
1989	25,981	4,771 ⁱ		18.4 ^h	9.2	2.3	357
1990	39,384 ^h	6,439 ^j		16.3	8.7	3.6	365
1991	42,854	5,796 ^k		13.5 ^f	9.3	2.4	279
1992 ^m	57,974	0		0.0	-	0.0	0
1993	46,549	5,034 ⁱ		10.9	9.9	1.5	264
1994	37,829	960		2.5	10.3	0.3	215
1995	37,778	6,773		18.0	10.4	4.2	215
1996	27,307	6,220 ⁿ		22.8	10.6	4.5	287
1997	47,791	3,976 ^o		8.3	9.9	0.6	220
1998	52,033	2,631	18,083 ^p	5.1	9.2	0.2	47 ^q
1999	34,314	2,751 ^o	7,482	8.0	10.5	0.6	122 ^r

^a Methods of calculating biomass have varied over the years. Biomass estimates listed follow methods used during that year.

^b Includes both bait and sac roe harvests.

^c Represents total District exploitation. During many years southern subdistricts are closed because exploitation of the local biomass reaches 20%, while northern subdistricts have remained open because little or no harvest has occurred.

^d Minimal biomass estimates due to poor survey conditions.

^e Includes an estimated 90 st of wastage.

^f Peak estimate made after the commercial fishery; the fishery was not re-opened due to the high probability of spawnouts present after two consecutive days of heavy spawning.

^g Peak biomass was sighted prior to arrival of the commercial buying fleet.

^h Biomass spotting conditions very poor throughout herring season; peak biomass represents minimum estimates; exploitation rate based on observed biomass.

ⁱ Includes an estimated 30 st of wastage.

^j Includes an estimated 60 st of wastage.

^k Includes an estimated 125 st of wastage.

^l Does not include an estimated 45 st of wastage.

^m No herring fishery occurred in 1992.

ⁿ Include an estimated 50 st of wastage.

^o Include an estimated 5 st of wastage.

^p Include 2,100 lbs of wild kelp and 16,083 lbs of *Macrocystis* kelp.

^q Includes 35 sac roe fishers, 1 bait fisher and 11 kelp fishers.

^r Includes 119 sac roe fishers, 1 bait fisher and 2 kelp fishers.

Appendix Table D4. Norton Sound commercial herring harvest (st) by subdistrict, by year, 1979 - 1999^a

Year	Subdistricts							Totals
	s.d. 1	s.d. 2	s.d. 3	s.d. 4	s.d. 5	s.d. 6	s.d. 7	
1979	319	405	555	0	0	0	14	1,293
1980	1,176	632	632	5	0	7	0	2,452
1981	3,068	831	471	1	0	0	0	4,371
1982	2,062	946	925	0	0	0	0	3,933
1983	434	1,265	2,733	0	65	85	0	4,582
1984	-	-	3,572	0	0	0	0	3,572
1985	1,538	188	1,675	0	147	0	0	3,548 ^b
1986	2,559	-	2,450	0	185	0	0	5,194
1987	2,218	174	1,690	0	0	0	0	4,082
1988	3,260	99	1,307	0	6	0	0	4,672
1989	3,256	60	1,425	0	0	0	0	4,741 ^c
1990	4,498	950	931	0	0	0	0	6,379 ^d
1991	0	880	4,792	0	0	0	0	5,672 ^e
1992 ^f	0	0	0	0	0	0	0	0
1993	2,288	587	1,881	0	278	0	0	5,034 ^g
1994	250	36	634	0	40	0	0	960
1995	2,359	604	1,524	0	2,108	167	0	6,762
1996	3,074	111	2,831	0	153	0	0	6,170 ^h
1997	2,046	62	1,864	0	0	0	0.5 ⁱ	3,976 ⁱ
1998	1,543	0	1,081	0	0	0	0	2,624
1999	285	323	2,050	0	0	0	8	2,746 ^k

^a Includes herring taken for sac roe and bait.^b Does not include an estimated 90 st of wastage.^c Does not include an estimated wastage of 30 st in abandoned gillnets.^d Does not include an estimated wastage of 60 st in abandoned gillnets.^e Does not include an estimated wastage of 125 st in abandoned gillnets.^f No commercial fishery in 1992.^g Does not include an estimated wastage of 45 st in abandoned beach seine sets.^h Does not include an estimated 50 st of wastage.ⁱ Does not include an estimated 5 st of wastage.^j Approximately 1000 lbs of herring bait was taken under 5AAC 27.971 in June (not during sac roe fishery).^k 75.8 tons added to sac roe total due to dewatering by buyers. 3 tons added to bait total due to dewatering by buyer.

Does not include an estimated 5 st of wastage.

PORT CLARENCE / KOTZEBUE DISTRICTS

Introduction

The regulation book states that in the Port Clarence and Kotzebue Districts, herring may be taken from April 15 through November 15, except that herring may not be taken during the open commercial salmon fishing season. However, prior to the 1987 season, no spring sac roe commercial fisheries had ever occurred within these districts. Interest in exploring these stocks has been expressed in recent years by industry personnel operating in the Norton Sound District. However, no large-scale effort to develop the fishery has occurred due to the late ice breakup and fishery timing in the Port Clarence and Kotzebue Districts.

The Port Clarence and Kotzebue commercial herring fisheries have been in regulation since 1982. The 1983 and 1984 regulation books set a guideline harvest of 150 mt (165 st) for each district. Since the guideline harvest has never been changed or repealed by the Board of Fisheries, it is assumed 165 st guideline harvest is still in effect. Presently purse seines, beach seines, and gillnets are legal commercial gear within these districts. Spawn-on-kelp fisheries are also allowed in regulation. Recent attempts at open pound *Macrocystitis* harvest in 1991 and 1992 were unsuccessful.

Local fishermen from Teller, Shishmaref, and Kotzebue have also expressed increasing interest in exploiting these stocks. While small harvests of herring for food/bait have occurred during the fall, the fisheries in these districts have been limited by lack of markets. Local fishermen and fishery operators in Kotzebue, Brevig Mission and Nome have also expressed interest in developing a spawn-on-kelp fishery within these districts.

Resource Investigations

Resource investigations of Port Clarence and Kotzebue Sound area herring stocks were conducted by ADF&G from March 1976-September 1978 (Barton 1978). These studies indicated that herring populations from Golovin Bay (Norton Sound) northward differed significantly in size and behavioral characteristics from herring populations occurring in the southern Bering Sea. Differences between populations were summarized as follows (Barton, 1978).

Seward Peninsula Populations

Southern Norton Sound to Southern Bering Sea Pelagic Populations

Smaller herring at age with lower vertebral counts.

Larger herring with probable higher vertebral counts.

Lower abundance.

Higher abundance.

Subtidal spawning (3m) in shallow bays, inlets and lagoons.

Intertidal and shallow subtidal spawning along exposed rocky headlands.

Zosteria sp. primary spawning substrate.

Fucus sp. primary spawning substrate.

More euryhaline.

Less euryhaline.

Overwinter in shallow bays; water is warmed by river discharge under ice cover.

Overwinter in deep ocean layers near the Pribilof Islands.

Fall (non-spawning) runs documented.

No fall runs documented.

Larval development in brackish water.

Larval development probable in more saline water.

Data collected from herring populations along the Seward Peninsula strongly indicated that a separate stock of herring occurs in the Port Clarence and Kotzebue Sound areas. This does not preclude the possibility of the occurrence of more southern stocks from utilizing this region, i.e., stocks which winter near the Pribilof Islands and migrate to the western Alaska coast to spawn. It is unlikely however, that herring stocks along the western Seward Peninsula migrate to the central Bering Sea for wintering, but rather remain in coastal lagoons, bays or inlets which are warmed by river discharge under the ice (Barton 1978). This may be a major factor in explaining size differences, i.e., environmental conditions. Water temperatures and feeding conditions in deep ocean waters are probably more favorable for growth than those in herring winter habitats along the Seward Peninsula, which apparently have become adapted to Arctic conditions (Barton 1978).

Aerial surveys are very difficult in the Port Clarence District due to organic coloring of the waters of Imuruk Basin, Tuksuk Channel, Grantley Harbor and to a lesser extent, Port Clarence. Aerial surveys were impractical in Imuruk Basin and Tuksuk Channel.

Additionally, the presence of other species of fish caught in test commercial gear sets indicate the need for verifying any biomass sighted. A further complicating factor within Port Clarence is the spring ice conditions. Port Clarence is a very sheltered body of water which becomes stained to a high degree over the winter and takes some time to clear once the ice melts. Typically, the outside waters are significantly warmer than the inside waters which are covered by ice longer thereby slowing solar gain and water mixing. Soon after the ice begins to shift the herring move into the warm shallow lagoons to spawn. The herring are invisible to aerial observation once they enter the stained water. The best aerial survey conditions exist just outside the entrance to the Port, where the herring mass just prior to the ice moving. One or two surveys have been flown each of the past several years, but virtually no herring have been observed because the narrow window of time for seeing the fish has been missed.

Spring/Fall Food/Bait Fishery

Although a fall fishery has probably existed for subsistence use within these areas for many years, a commercial venture has only been attempted recently. The primary use of those fish are for crab bait and dog food. The fishery typically occurs during September and the ice free portion of October. A fish buyer located at Nome in 1994 and 1995 who provided a ready crab bait market and transportation for the fish had facilitated the harvest. A small bait fishery with a harvest less than 10 tons occurs in most years. However, no bait fishery has occurred since 1996 (Table 19).

Sac Roe Fishery

The Port Clarence fishermen have been unable to attract a sac roe buyer for their relatively late fishery. During 1991 and 1992, one individual imported macrocystus kelp and attempted an open pound. No herring spawned on the imported kelp, although ripe herring were found in close proximity and very light spawn was found on blades of *Zostera sp.* nearby.

Table 17. Port Clarence District commercial herring fishing history.

Year	Fishery	Effort	Harvest	Price	Value
1986	Fall Bait	1 Permit (G/N)	130 lbs.	\$1.00/lb	\$ 130
1987	Sac Roe	3 Purse Seiners 3 Gillnetters	145.5 st	\$800/st@10%	\$ 77,466
1987	Fall Bait	Unknown # of Permits (G/N)	1,100 lbs	\$.30/lb	\$ 330
1988	Sac Roe	3 Purse Seiners 3 Gillnetters Combined Total	56.4 st @7.6% 23.6 st @8.9% 80.0 st @8.2%	\$1000/st @10%	\$ 57,500
1994	Fall Bait	4 Permits (G/N)	8,706 lbs	\$.45/lb	\$ 3,917
1995	Spring Bait Fall Bait	8 Permits (G/N) 2 Permits (G/N) Combined Total	19,193 lbs 9,119 lbs 28,312 lbs	\$.61/lb \$.37/lb \$.53/lb	\$ 11,625 \$ 3,393 \$ 15,018
1996	Spring Bait	4 Permits	5,546 lbs	\$.40/lb	\$ 2,218

SECTION 3: KING CRAB
(Includes Norton Sound,
Port Clarence and Kotzebue Districts)

SECTION 3 - KING CRAB

INTRODUCTION

Norton Sound

The Norton Sound Section of the Northern Bering Sea District consists of all waters in statistical area Q that are north of the latitude of Cape Romanzof, east of 168 west longitude, and south of the latitude of Cape Prince of Wales (Figures 14 and 15). A large vessel summer commercial red king crab (*Paralithodes camtschatica*) fishery has existed in the Norton Sound Section from 1977 through 1992 (Appendix Table E3). No summer commercial fishery occurred in 1991 due to a lack of staff necessary to manage the fishery. The budget had been cut the previous winter. In 1992, the large vessel summer commercial fishery resumed. Regulation changes adopted during the March 1993 Board of Fisheries meeting changed the character of the fishing fleet to that of a small boat fleet. A superexclusive designation went into effect for the Norton Sound commercial crab fishery June 27, 1994. A vessel registered for the Norton Sound crab fishery may not be used to take king crab in any other registration area during that registration year. Federal regulators established a vessel moratorium in 1997 that restricted new entrants in to the fishery to only those vessels 32 feet or less with the intention to create a license limitation in the near future.

The National Marine Fisheries Service conducted their most recent trawl survey to examine the abundance of Norton Sound red king crab in late August 1991 (Appendix Table E5). The results of that survey as compared to the 6 previous trawl surveys show a gradual trend of increasing abundance since 1982. The 1991 survey found 3.5 million pounds of legal king crab in the commercial fishing district. NMFS has not made a survey of Norton Sound since 1991. The quota for the Norton Sound Section for the 1996 season had been set at 340,000 pounds, to approximate an exploitation rate of 10%.

The Alaska Department of Fish and Game conducted a trawl survey to examine the abundance of Norton Sound red king crab from August 7 through August 18, 1996 (Appendix Table E5). A population estimate was generated which indicated the legal biomass had declined to 40 percent of the biomass estimated in 1991. The results from the 1996 trawl survey prompted the fishery managers to reduce the harvest rate in the 1997, 1998 and 1999 commercial fishery to five percent of the legal biomass and set the guideline harvest at 80,000 pounds. This was a significant reduction from the previous exploitation rate and guideline harvest. The Alaska Department of Fish and Game conducted a trawl survey in August of 1999. A population estimate generated after the survey indicated a legal male biomass of 1.6 million crab or 4.8 million pounds (Appendix Table E5). This is a significant increase. Data from the 2000 winter crab study will be used to generate a population estimate for the 2000 summer red king crab fishery.

St. Lawrence Island

The St. Lawrence Island Section lies immediately west and north of the Norton Sound Section. Because the Bering Sea crab fleet bases in Dutch Harbor, the St. Lawrence Island Section has been managed by ADF&G's Westward Region's Dutch Harbor office. Until recently, the Dutch Harbor fishing fleet has been the primary commercial group interested in that area. The only reported commercial catches to date in the St. Lawrence Island Section were made in 1983 when 52,557 pounds of blue king crab were delivered from 13 landings, in 1989, when 3,603 pounds of red king crab and 984 pounds of blue king crab were delivered from 8 landings, in 1992 when 53 pounds of blue crab were landed and in 1995 when 7,913 pounds were delivered from three landings.

In 1983, the commercial crab fleet concentrated near the southeast shore of St. Lawrence Island. The following year a regulation proposal to close the waters within 10 miles of all inhabited islands within the section was adopted in an attempt to protect stocks targeted by local fishermen and reduce impacts on subsistence marine mammal harvests during the winter. During the 1989 season, three fishing vessels prospecting in that section found relatively few blue king crab near rocks and shoals still open to commercial fishing, but red king crab were discovered in low densities near Kivalina, the northern boundary of the section. The villagers of Little Diomed Island have also traded and sold winter caught blue king crab with residents of Nome and other villages for years. The Department has not been able to obtain an accurate estimate of the magnitude of this trade. The remoteness of this village is also a factor contributing to the lack of catch records. Current regulation allows the commercial harvest and sale of king crab near shore during the winter. The Board provided the same provisions in the regulation as are in effect for Norton Sound to allow a commercial winter fishery. However, local residents of St. Lawrence Island have decided not to export any of their winter catch for commercial sale.

1999 COMMERCIAL FISHERY

Norton Sound Summer Commercial Fishery

The 1999 summer commercial red king crab fishery opened at 12 noon, July 1 in the Norton Sound Section. An emergency order relaxing the closure line described in regulation eastward to 161° 30' west longitude was announced June 19 to be effective at the fishery opening on noon July 1. Another emergency order was announced July 2 relaxing the nearshore closure line in the vicinity of Unalakleet eastward to 161° 15' west longitude effective noon July 3. Residents of eastern Norton Sound had requested that commercial fishing be allowed in areas more accessible to their communities. One commercial fisher had registered to fish in this eastern Norton Sound statistical area. Over the past year there has been some discussion of the impacts of relaxing the eastern Norton Sound line and changing the fishing season. Because there was only a limited market for king crab in Norton Sound during the 1999 season and because the timing of

fish migrations had been delayed, there was an opportunity to gather information about the impacts of fishing early and nearer the eastern shore. A fishing vessel fishing in this open area was required to have an ADF&G observer on board to record size and health of the crab caught. The limited commercial effort was not expected to have a significant impact on the distribution of crab harvest between commercial and subsistence users of the resource.

The first fishers registered July 1, and the first delivery was not made until July 7. The fishery was closed by emergency order at 12 noon, September 4. The fishery had been extended 24 hours due to poor weather in order to provide fishers an opportunity to get all their pots out of the water in a safe and cost effective manner. The final delivery was made on September 7. Fishers had checked and pulled all fishing pots prior to the closure, but left a storage pot full of harvested crab out until they coordinated their market. A total of 10 fishing vessels and fishers were registered for the summer commercial crab season. All fishers were registered as catcher/sellers because no registered crab buyer was present in the ports of Nome or Unalakleet. Catcher/sellers coordinated flying live crab to buyers in Anchorage and sold live crab off the dock locally. One vessel over 32 feet participated in the 1999 summer season. This vessel was 45 feet in length and obtained an interim moratorium permit to participate in the 1999 crab fishery. No floating crab processors or catcher/processors operated in Norton Sound during the 1999 summer fishery, therefore no independent observers were placed on board commercial vessels. One fishing vessel based out of the Unalakleet area had an ADF&G observer on board for two of its trips to monitor crab catches. Port sampling in Nome was attempted at various times throughout the fishery. Because of the lack of a buying station in Nome, no commercial sampling was done due to erratic scheduled boat trips and problems with airline scheduling shipments of crab out of town. Fishers would hold their live crab in pots just offshore until they could schedule airline transport to haul live crab to Anchorage. Shipment would often be late at night as space allowed. Erratic scheduling also caused problems with fishers and their Anchorage markets.

Catch reporting logs were kept by buyers and by skippers of catcher vessels for each statistical area fished. Buyers verbal reports were relayed daily by 9:00 a.m. to the ADF&G office in Nome. Fish tickets were due in to the ADF&G office on Friday of each week throughout the duration of the fishery. Vessel reports from fishermen and Catcher/Seller fish tickets were required every Monday for the duration of the fishery. Compliance with reporting requirements was good. Daily catch statistics can be found in Table 1 and Figure 3

Of the ten vessels which made deliveries in the 1999 season six registered from Norton Sound, three from the Yukon Delta and one was Alaskan but from outside the section. Norton Sound fishers caught 35% of the total harvest, Yukon Delta fishers caught 27% of the harvest and other Alaskan residents harvested the remaining 38%.

Board of Fisheries regulations specific to Norton Sound Section are:

- 1) 5AAC 34.915, which directs the Department to manage the Norton Sound summer king crab fishery for a harvest of one half the exploitation rate determined under 5AAC 34.080.
- 2) 5AAC 34.935, which established a closed area with a defined boundary approximating 15 miles from the beach in the Norton Sound section, to protect a long established winter subsistence fishery.
- 3) 5AAC 34.925 (i) and (j), requiring pot tags and limiting vessels of 125 feet in length or less to 40 pots each and larger vessels are limited to 50 pots.
- 4) 5AAC 34.906, designates the Norton Sound Section to be a superexclusive registration area.

Statistical Summary

The total commercial catch was 8,734 crab (Table 22). A total of 23,553 pounds were harvested. Ten vessels made deliveries, and 9 permit holders fished. Average weight for commercially caught crab was 2.7 lb./crab. A total of 360 pots were registered and 1,630 pot pulls were recorded during the fishery. The average price/pound was \$3.08. The fishery value was approximately \$72,543 (Appendix Table E3).

Fish ticket reports document that 8 statistical areas were fished. Statistical area 636401 had the highest catch with 14,201 pounds taken or approximately 60.3% of the entire harvest. The second highest catch came from statistical area 646330, which was 3,021lbs or 12.8% of the harvest. The overall CPUE for the 1999 fishery was 5.4 crab/pot. Statistical area 646401 had the greatest CPUE with 17.5 crab/pot.

Commercial Catch Sampling

Carapace length measurements and shell age were collected from 561 legal male red king crab throughout the 1999 summer fishery and during the 1999 Norton Sound king crab trawl survey. Carapace age was classified as new (11 months old) or old (at least 23 months old). Overall mean carapace length of the legal male red king crab sampled was 118.1 mm. Male crab with new shell carapaces made up 87.9% of the total legal male king crab sampled, and old shell crab made up 12.1% of the sample (Table 3, Figure 4). Recruit crab made up 41.7% of all legal male crab sampled (Appendix Table E2). Postrecruit crab made up 58.3% of the legal crab sampled.

Tagged Crab

Five male crab with tags were returned to the ADF&G office during the 1999 commercial fishery (Table 4). All but one of these five tagged crab had been tagged in 1999. The crab with tag number NX3017 was tagged March 9, 1995 and grew 37 mm. Three tags with no crab were also returned. These three tags provided no useful growth information.

Enforcement

The Fish and Wildlife Protection officer was unable to patrol the fishery. No cases were filed during 1999.

Norton Sound Winter Commercial Fishery

Regulation allows a winter commercial fishery in the Norton Sound Section from November 15 through May 15, the fishery typically takes place near Nome. The winter commercial fishery is required to take place from the ice, not from vessels. During the winter of 1998-1999, five commercial fishermen reported selling a total of 2,714 red king crab (Appendix Table E6). The villages east of Nome reported only limited harvests of crab. Ice conditions were generally unfavorable throughout Norton Sound, although the sea ice near Elim was fairly stable.

The harvest is divided between local residents who buy crab directly from the fishermen and other non-local markets such as Anchorage. Crab are sold in Nome for an average of ten dollars per crab, roughly \$3.69 per pound. The 1998-1999 winter catch of 7,041 pounds was estimated to be worth about \$25,981.

The winter crab fishermen generally use crab pots but some use handlines to "prospect". Deploying pots through sea ice is laborious, but hand lines can be dropped through a large ice auger hole in a short period of time. The other advantage of hand lines is that during periods of favorable weather hand lines may be deployed from new, less stable ice without the risk of losing more expensive crab pots. Most fishermen consider commercial crabbing a sideline and hold other jobs. Usually, two or three of the winter crab fishermen sell the majority of the crab. Because the volume of crab involved is low, no processor has found it profitable to operate locally. The crab sold locally are all sold fresh as are those shipped to Anchorage or other non-local markets. During the mid-winter months, fishermen find it difficult keeping the crab from freezing. Many Nome residents prefer to buy frozen crab since they are able to extract the meat prior to cooking. Fresh frozen crab are easily marketed in Nome, but are not accepted in Anchorage markets.

SUBSISTENCE FISHERY

Red king crab are utilized by Norton Sound residents mainly during the winter. Fishing occurs through cracks or holes cut in the ice with the use of handlines and pots. In order to document trends in the subsistence harvest, the Board of Fisheries enacted a regulation in 1977 requiring subsistence fishermen in Norton Sound to obtain a permit prior to fishing and to record daily effort and catches on these permits (Appendix Table 6).

The first year subsistence permits were required had the highest number of permits issued to date and a relatively high harvest rate were recorded. The fishery declined sharply the following year and remained at very low levels throughout the 1981-82 season. The lack of success in the winter crab fishery during some past years has been attributed to a declining crab population caused by the removal of crab in the summer commercial fishery together with low recruitment, low effort due to poor ice conditions, and changes in the near shore winter distribution of crab. All these factors probably had some effect on the success of the winter fishery in varying degrees. During the 1978-79 winter fishery, the king crab population was still in relatively high abundance. Despite this relatively large population, winter catches were the poorest on record indicating that the major factors limiting winter catches were probably poor ice conditions and the distribution of crab. During the winter of 1981-82, poor winter catches could more reasonably be attributed to a declining crab population since the crab population was at a much lower level. Subsistence fishing success during the winters of 1982-83 through 1986-87 had improved due to a rebuilding of the population and increased use of more efficient gear (pots instead of handlines). Unstable ice conditions and record snowfalls adversely effected the 1987-88, 1988-89, and 1992-93 catches. During years of stable ice conditions, approximately 100 fishermen have averaged 100 crab each.

The 1998-1999 season had relatively stable ice conditions near Nome and Elim, however areas near Golovin Bay and Eastern Norton Sound were less stable. Subsistence fishers obtained 95 permits (Table 23). Of the 80 permits returned, 71 reported fishing. Sixty-seven fishers reported using pots, three reported using handlines, and one reported using a combination of the two gears. Permit data indicates the subsistence harvest consisted of 7,474 male crab and 25 female crab. The average catch for fishers was 106 crab. This is well above the average since 1978 (Appendix Table E6).

STOCK STATUS / RESEARCH

There has been a change in the character of the summer commercial fishery since 1993 due to regulation changes affecting pot limits, opening dates and a regulation making Norton Sound a superexclusive registration area. The quality and quantity of data collected since the 1993 summer crab fishery has differed greatly from previous years due to the nature of the small vessel fishery. No floating processor or catcher processor took part in the 1999 fishery, therefore no independent observers were onboard commercial vessels.

The ADF&G fishery monitor did not have the opportunity to make observations on small catcher vessels during the 1999 fishery. Only the observer on the vessel fishing in near shore waters of eastern Norton Sound collected data on observed pot lifts, sublegal male and female length frequencies, and catch rates of legal and sublegal crab during the commercial fishery. This data may be of interest in considering proposals to open the season earlier or to allow fishing closer to shore.

In 1976, when monitoring of the Norton Sound king crab population first began, the population was mainly composed of prerecruit and recruit crab. The initial population assessment survey by the NMFS estimated the legal male king crab population at 8.1 million pounds (Appendix Table 5). The legal male crab population peaked in 1978 at an estimated 11 million pounds. During the 4 years following 1978, recruitment into the legal male crab population was very low. Subsequent NMFS surveys in 1979 and 1982 documented a population of predominantly postrecruit crab, and estimated the population had declined to 2.6 million pounds by 1982. Beginning in 1981, sublegal crab abundance began to increase, and by 1983 recruitment into the legal male population also began to increase. No assessment work was conducted in 1983 or 1984. However, samples of the commercial catches indicated a significant increase of recruit crab into the legal male population; from a historic low of 10% in 1981 to 59% in 1984.

In 1985, both NMFS and ADF&G conducted population assessment surveys in Norton Sound (Appendix Table 5). After the commercial fishery in 1985, NMFS conducted a population assessment survey using trawl gear over a slightly larger area than that surveyed by the Department. Male king crab sampled in NMFS trawls were in the process of or had just molted with the result being that their estimate of 3.4 million pounds of legal male king crab included some recruitment. Adjusting this estimate for molting, and including the summer commercial harvest, an estimated three million pounds were present prior to the 1985 August fishery. Both surveys documented relatively substantial numbers of recruit crab and a healthy percentage of prerecruit crab.

During September of 1988 NMFS conducted a fifth population assessment with trawl gear. They sampled an area roughly the same size as in 1985, but increased sampling frequency in the proposed mineral lease area near Nome. The timing of the study, which occurred during the male molt, was almost a month earlier than similar surveys in the past. Nearly all the 1988 catch was in pre-molt condition. NMFS estimated 3.0 million pounds of legal male and 1.0 million pounds of prerecruit-one male red king crab; totaling 4.0 million pounds. Annual mortality was estimated at approximately 20% or 0.8 million pounds. Ignoring growth and the winter harvests, the population prior to the 1989 summer fishery would have been 3.2 million pounds, very close to the 1985 trawl estimate of 3.4 million pounds.

NMFS conducted a sixth trawl survey of Norton Sound during late August 1991 with a reduced number of tows. Each station had only a single sampling tow, as compared to each station having both a day and night tows during previous surveys. This reduction in sampling had the effect of introducing more variability into the estimate. The legal crab

biomass in the summer fishing area was estimated to be 3,400,000 pounds and the total Norton Sound legal biomass was estimated to be 4,009,000 pounds. Since the survey occurred prior to the molt, a mortality of 10% was assumed for the year following the estimate. With no summer or winter fishery data to compare with the survey results, a conservative biomass of 3,400,000 pounds was used as the basis for the 1992-96 harvest guideline. The Norton Sound red king crab population was thought to be stable with harvest set near 10%.

NMFS has discontinued their trawl surveys of Norton Sound. The Department was able to utilize recently appropriated money for a trawl survey during August of 1996. The methodology used was very similar to that used by NMFS in previous surveys. The legal biomass was estimate to be 1,600,000 pounds. This is a significant decline from the previous survey. The Department decided that the population was far below its carrying capacity and was closely approaching the threshold below which a commercial harvest should not occur. There are indications that the sublegal portion of the population is relatively strong in comparison to the legal portion. It was decided that the exploitation rate would be reduced to five percent of the legal biomass. This reduced harvest rate and the expected strong recruitment allowed for a rapid recovery of the legal biomass.

The survey conducted during August of 1999 found a significant increase in the legal male population of red king crab (Appendix Table E5). The population estimate was 1.6 million legal crab or 4.8 million pounds.

FUTURE INVESTIGATIONS

The trawl survey that occurred during the summers of 1996 and 1999 in Norton Sound was made possible by a budget increment passed by the legislature. This is to be a regularly scheduled survey rotating between districts. Both funding for a sustained winter research program and a triennial trawl survey to evaluate Norton Sound crab populations were provided for in that legislation. A winter pot survey is planned during February, March, and April. The results of the recent trawl survey and the upcoming winter study will be used in a model to project the summer 2000 legal biomass and an appropriate harvest guideline.

OUTLOOK FOR 2000

In 1999, the legal red king crab population was estimated to be near the historic high biomass level. The population level had nearly tripled since 1996. The legal male biomass is now believed to be within the range staff believes will produce the highest sustainable yields. Current size composition data indicates, that the portion of crab population classified as large old shell males is some what depressed but is expected to increase in number somewhat in the next few years. Large old-shell males are responsible for most reproduction within the male population. It will be important to maintain this segment of the population to provide for continued recruitment. A guideline harvest goal of 336,000

pounds has been set for the Norton Sound Section during the 2000 season. A 336,000 pound harvest equates to a 8% exploitation of the 4.2 million pound legal male population level estimated for 2000. The distribution is concentrated further east than in the past. Fishing effort is expected to be focused near Rocky Point.

Table 18. Commercial harvest of red king crab from Norton Sound Section by statistical area, Norton Sound District, 1999 (summer fishery only).

Statistical Area	Total Harvest		Pots Pulled	CPUE	Average Weight (Lbs.)
	Number	Pounds			
616331	185	633	42	4.4	3.42
626401	150	508	20	7.5	3.39
636401	5,522	14,201	886	6.2	2.57
646330	1,027	3,021	182	5.6	2.94
646401	70	221	4	17.5	3.16
656330	509	1,300	88	5.8	2.55
656401	990	2,739	368	2.7	2.77
666401	281	930	40	7.0	3.31
Total	8,734	23,553	1,630	5.4	2.70

Table 19. Winter 1998-99 subsistence red king crab catches and effort by gear type, Norton Sound area.

Gear Type	# Permits Fished ^a	# Males Caught	# Males Kept	# Females Caught	# Females Kept	Total Crab Captured	Total Crab Kept	Average Harvest per Fisher
Pots	67	10,019	7,449	573	25	10,592	7,474	112
Handlines	3	9	9	0	0	9	9	3
Both	1	50	50	0	0	50	50	50
Unknown	0	0	0	0	0	0	0	0
Totals	71	10,078	7,508	573	25	10,651	7,533	106

Number of Permits given out= 95

Number of Permits returned= 80

^a Some fishers use both handlines and pots to harvest crab.

Figure 13. Statistical areas for the Norton Sound red king crab fishery.

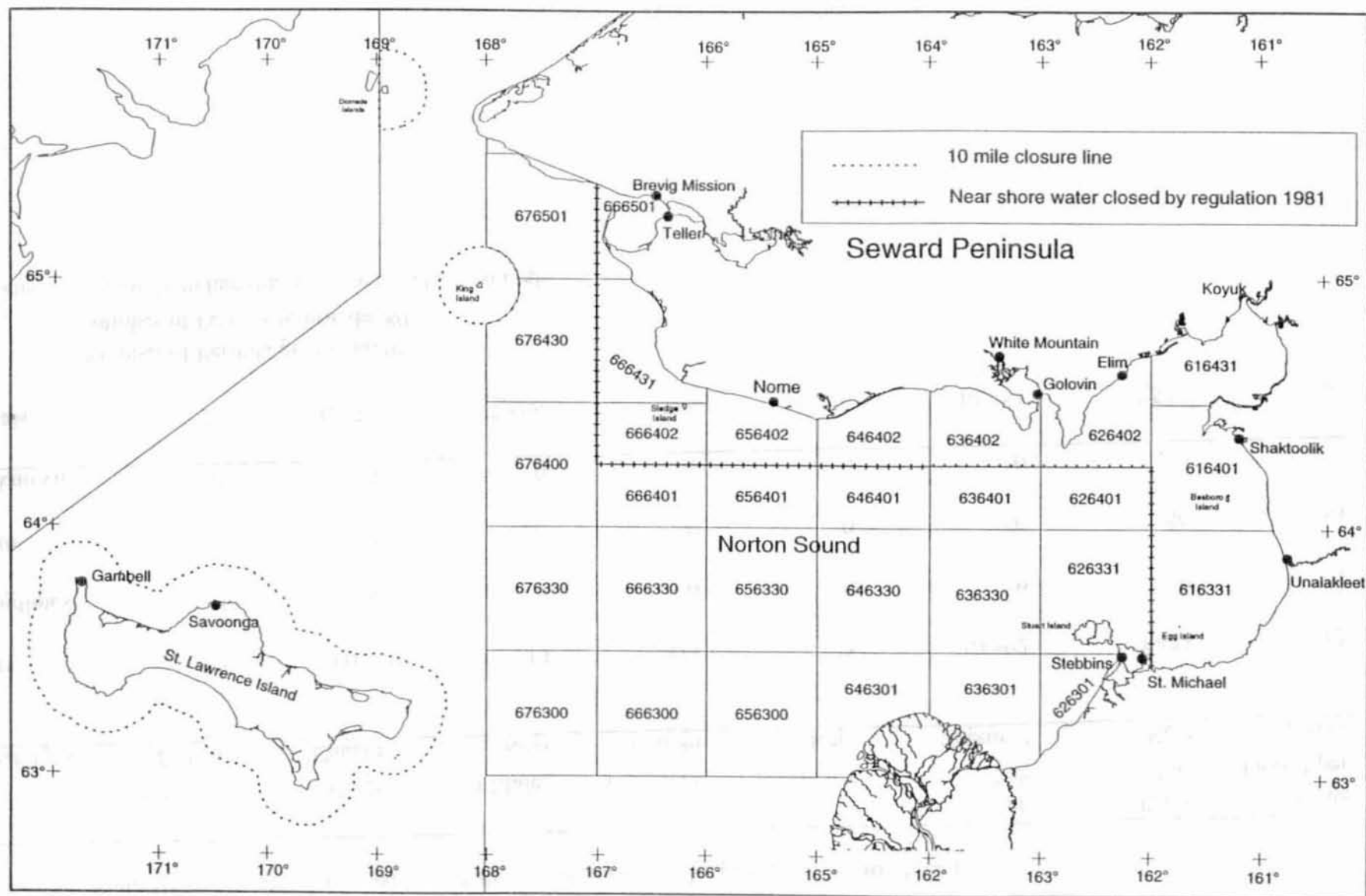
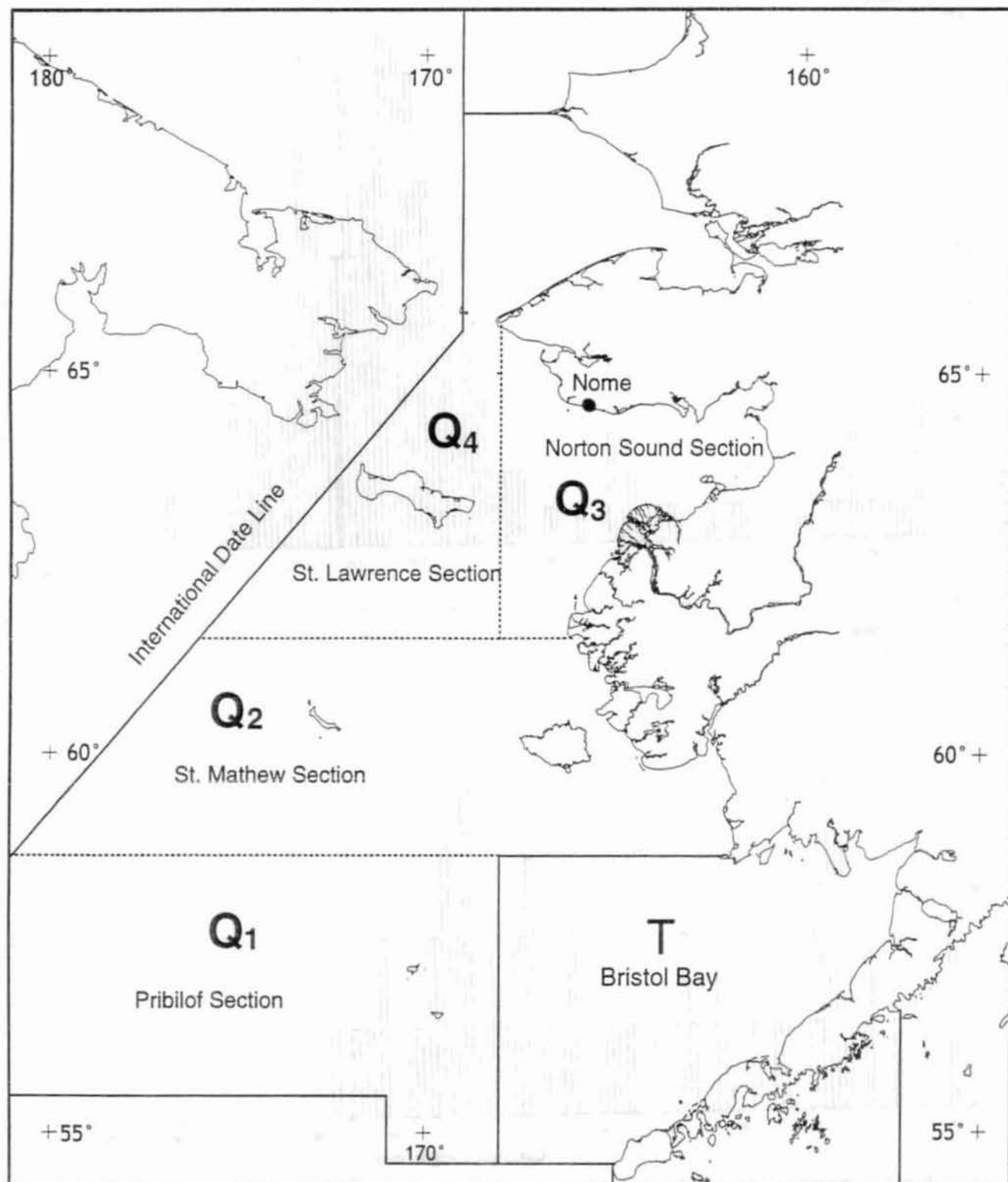


Figure 14. King crab fishing sections of Statistical Area Q.



Norton Sound Red King Crab

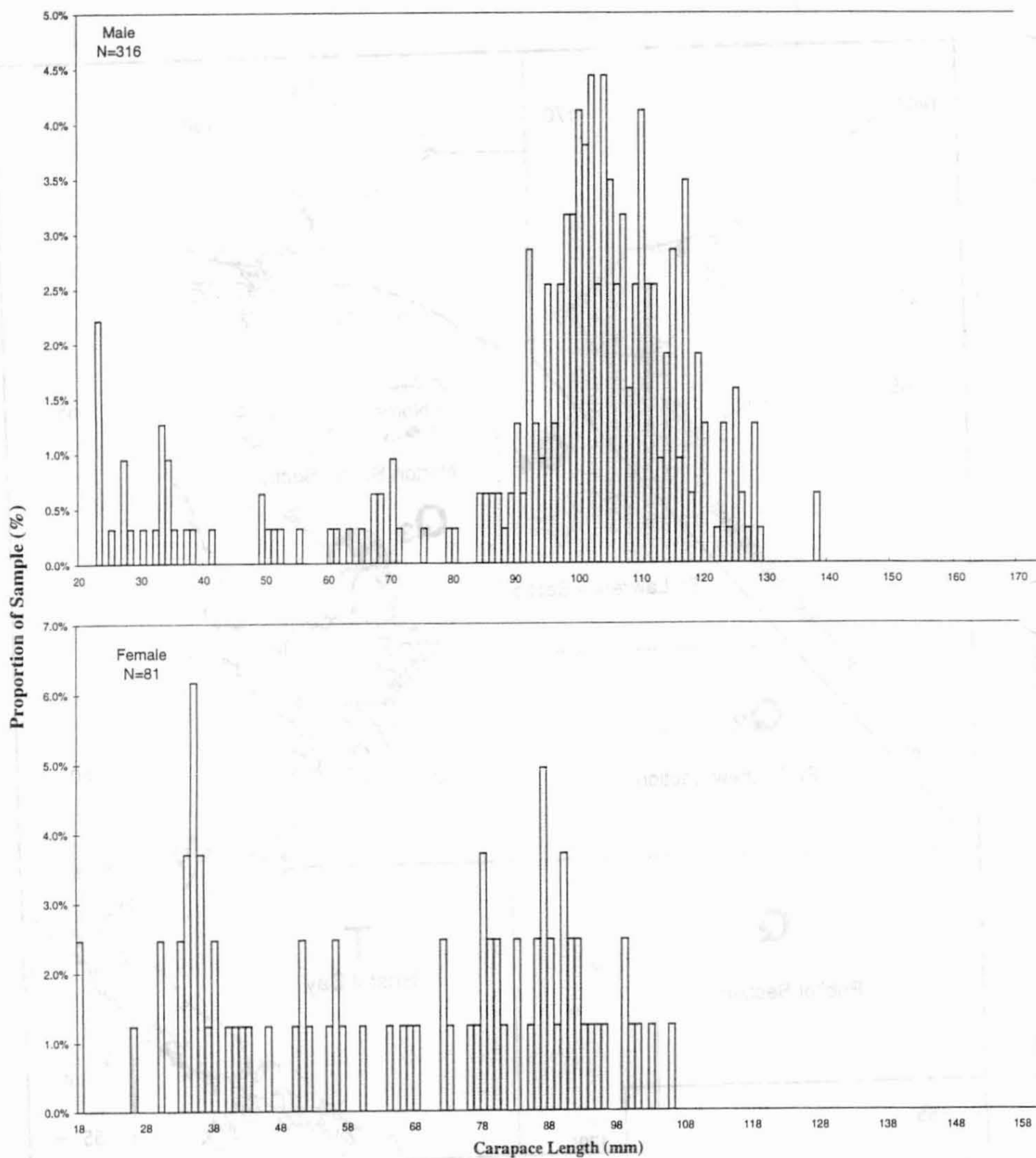


Figure 15. Norton Sound male and female red king crab size distribution from a trawl assessment survey conducted by ADF&G, 1999.

Norton Sound Red King Crab

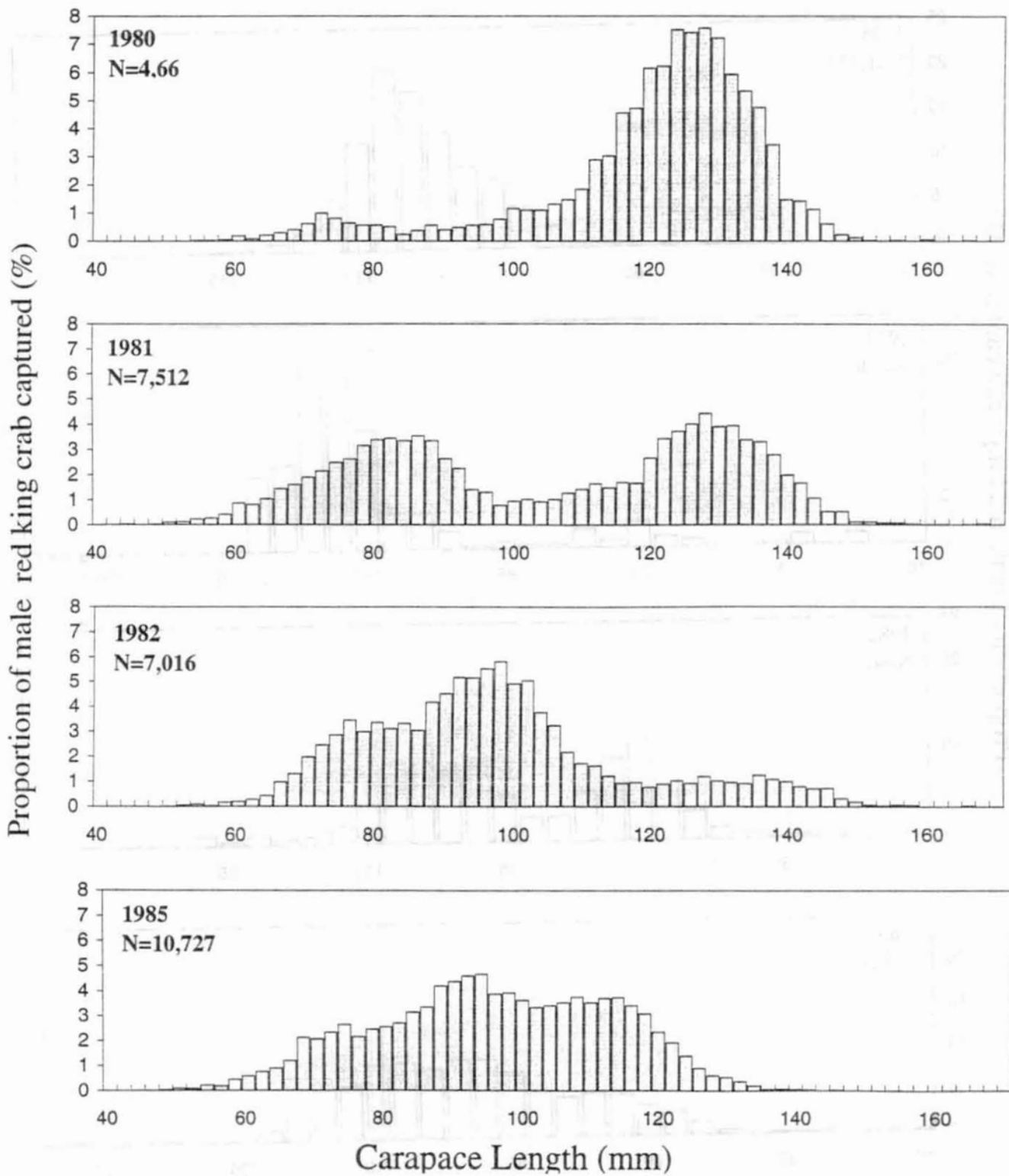


Figure 16. Norton Sound male red king crab size distribution from pot assessment surveys conducted by the Alaska Department of Fish and Game, 1980, 1981, 1982, and 1985.

Norton Sound Red King Crab

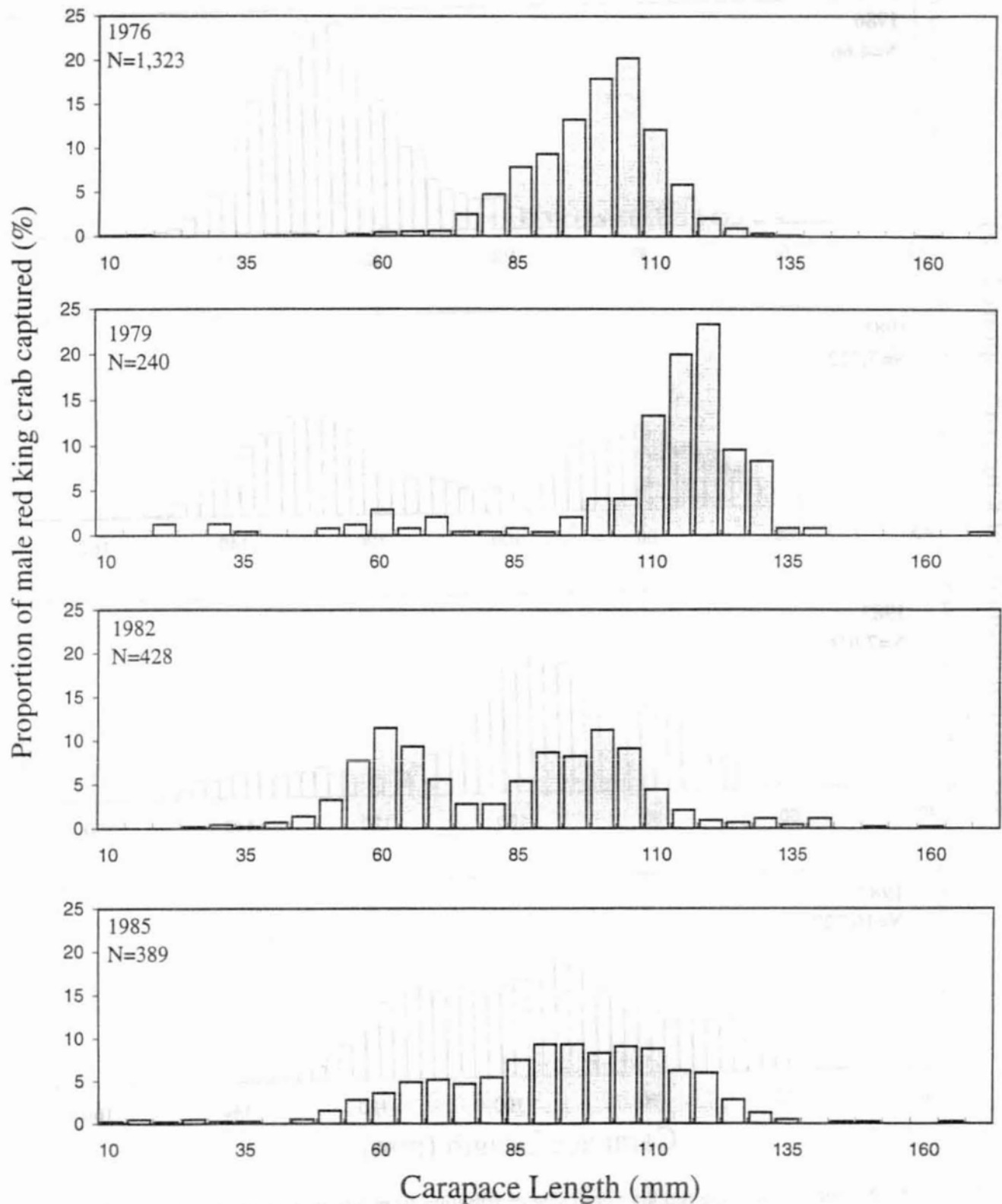


Figure 17. Norton Sound male red king crab size distribution from trawl assessment surveys conducted by the National Marine Fisheries Service, 1976, 1979, 1982, 1985, 1988, 1991, and by ADF&G in 1996, and 1999 (Page 1 of 2).

Norton Sound Red King Crab

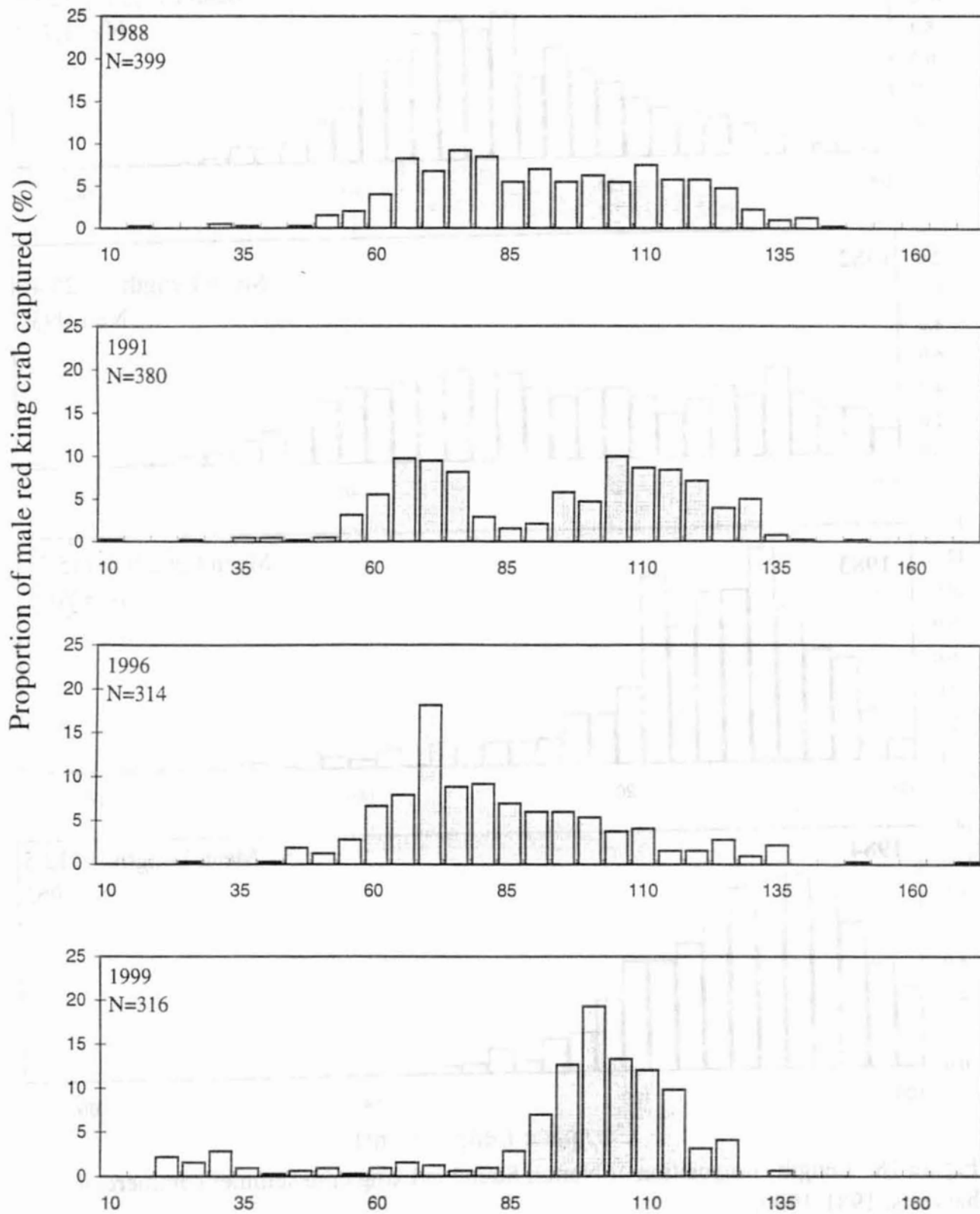


Figure 18. (Page 2 of 2)

Carapace Length (mm)

Norton Sound Red King Crab

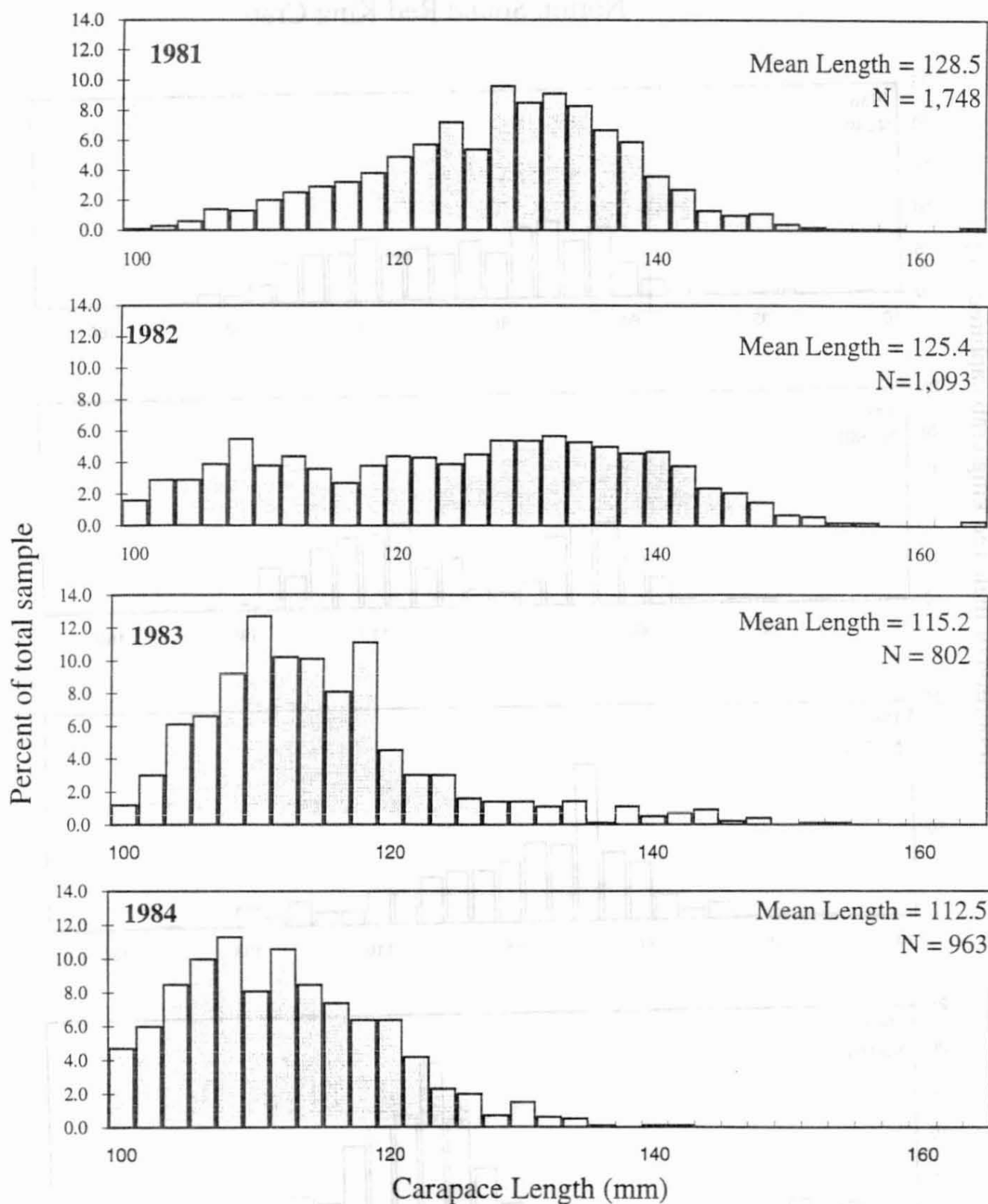


Figure 18. Length composition of Norton Sound red king crab summer commercial harvests, 1981-1999.

Norton Sound Red King Crab

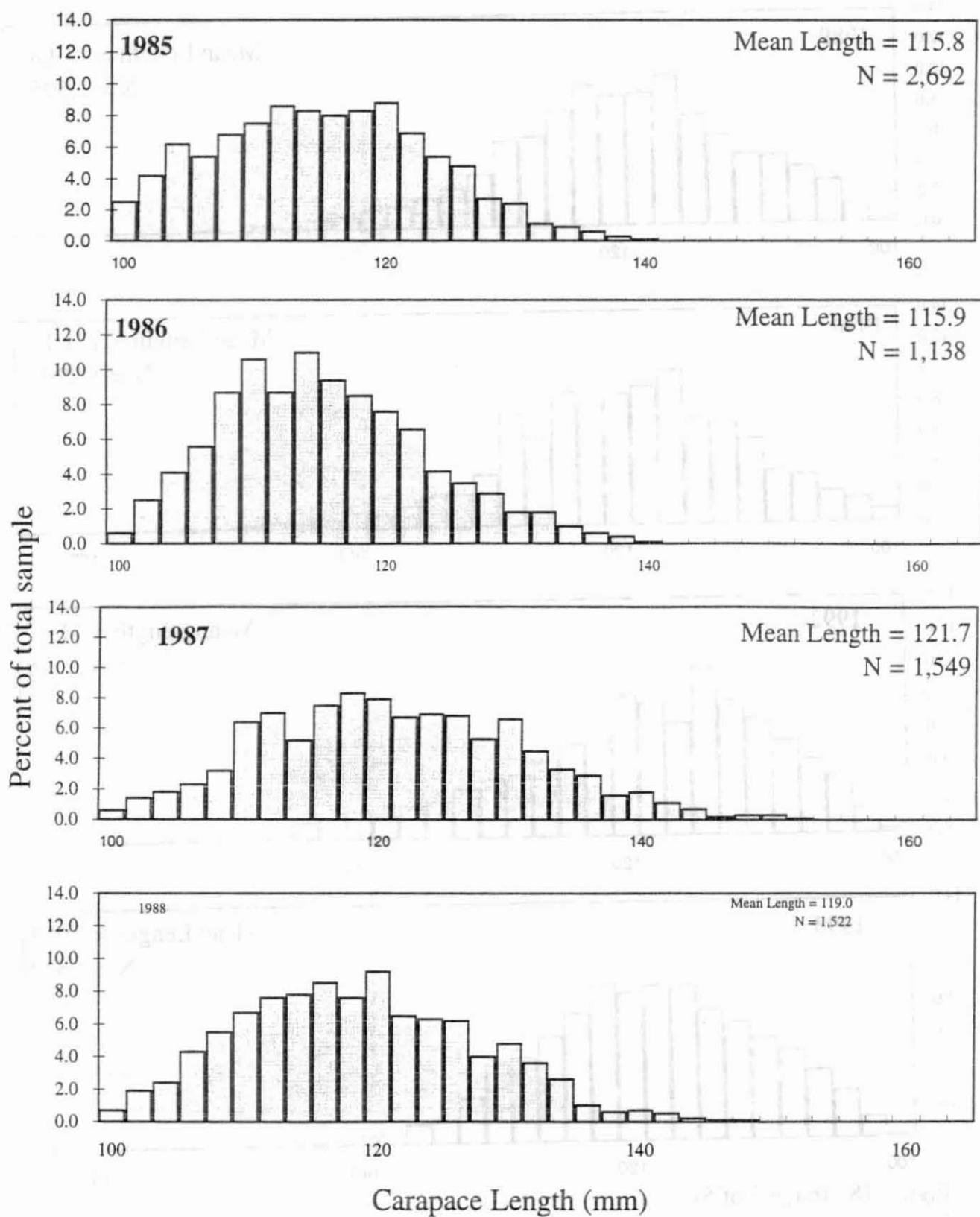


Figure 18. (page 2 of 5)

Norton Sound Red King Crab

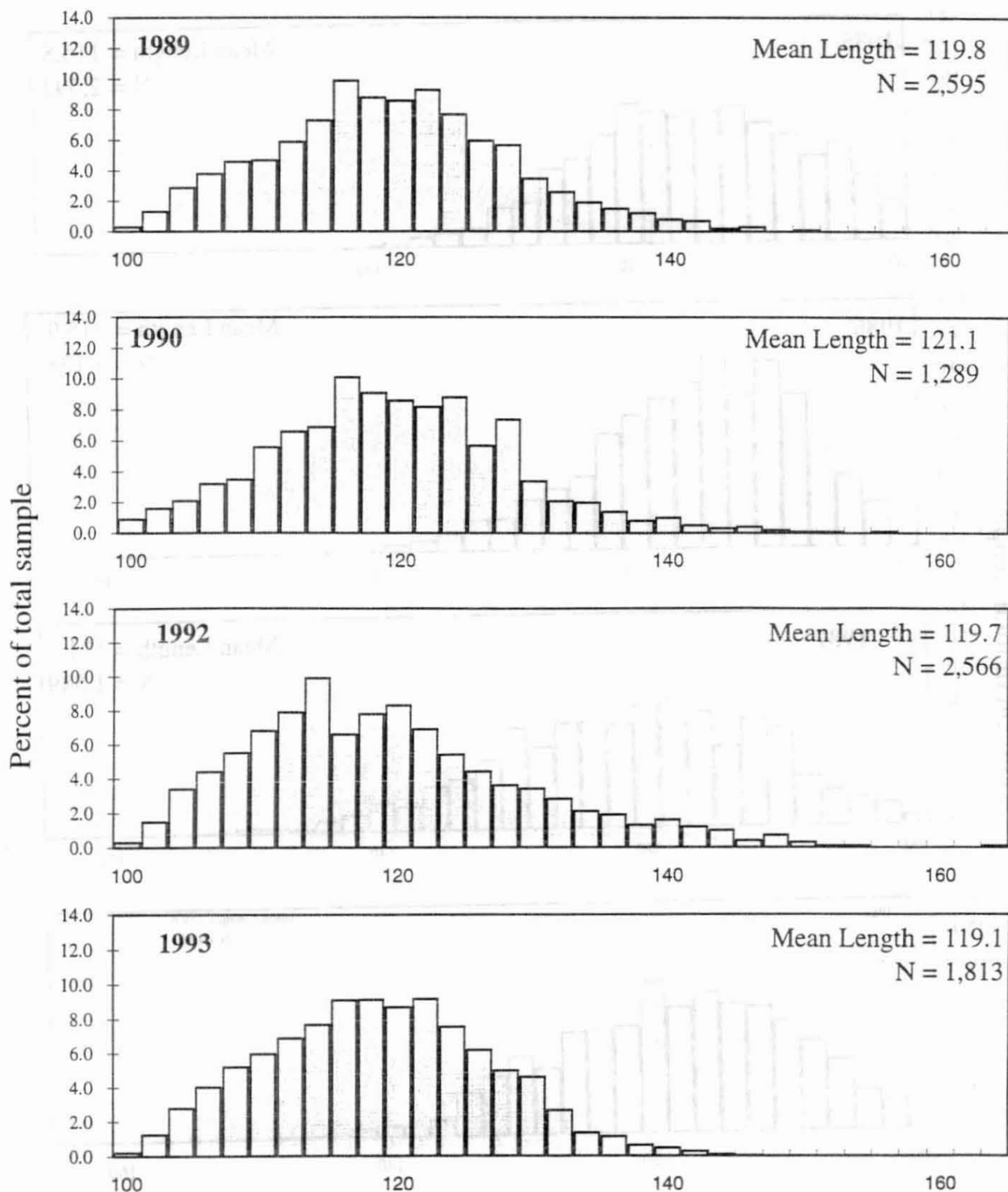


Figure 18. (page 3 of 5)

Note: There was no fishery in 1991.

Norton Sound Red King Crab

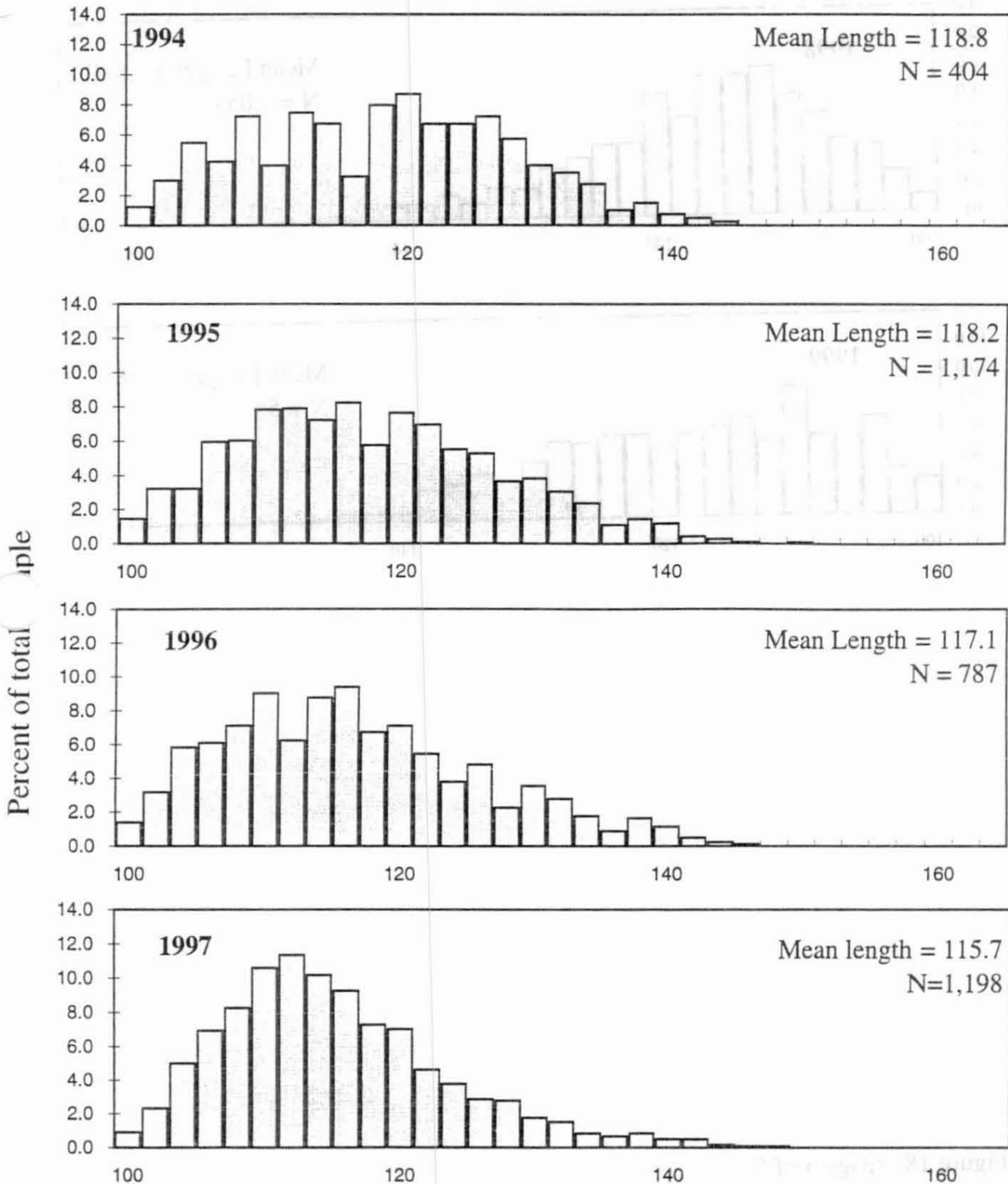


Figure 18. (page 4 of 5)

Norton Sound Red King Crab

Percent of total sample

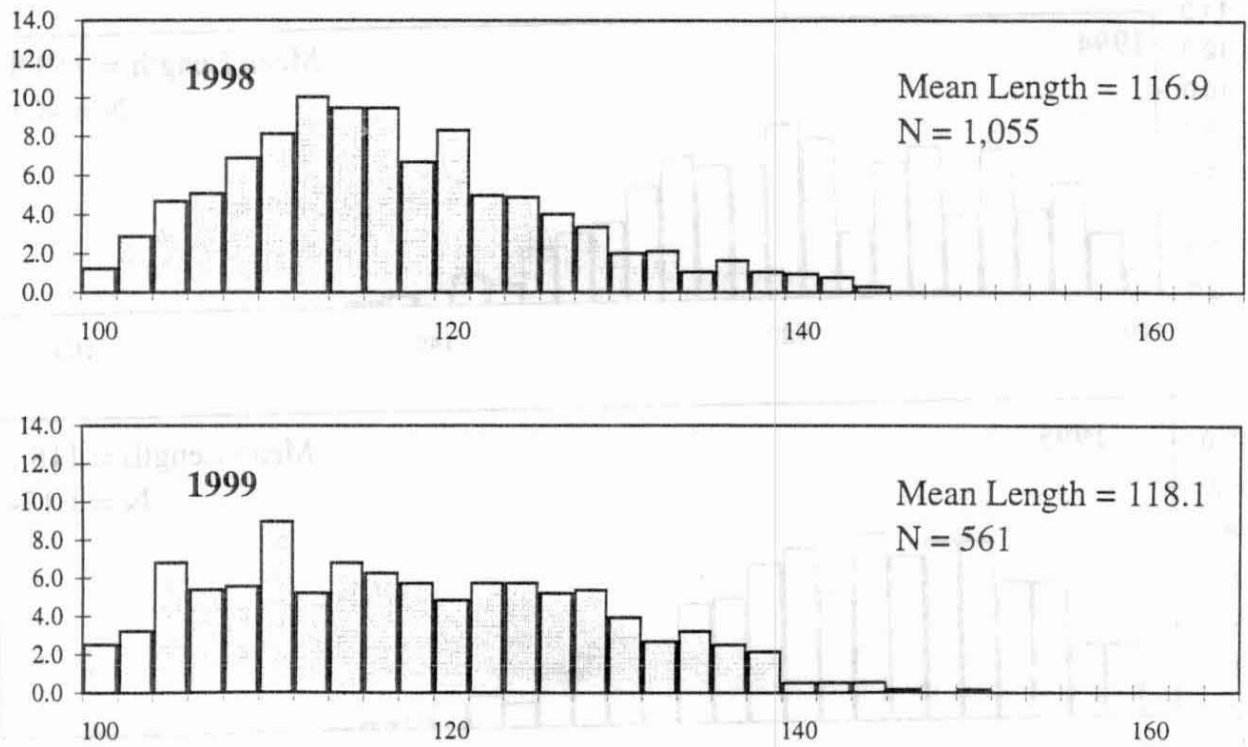


Figure 18. (page 5 of 5)

Appendix Table E1. Historic commercial harvest of red king crab from Norton Sound Section, Eastern Bering Sea, by statistical areas, 1977-1999 (catch in pounds).^a

Statistical Area	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996 ^b	1997	1998	1999	Totals	
616331	7,893																48					633	7,941	
616401																		35					35	
626331	40,020					22													61				40,103	
626401	31,572			4,830	399													18,971	45,045	18,066	8,065	508	126,948	
626402	38,995																						38,995	
636330																			4,560	3,838	2,449		10,847	
636401				12,398	61,823	32,246	5,880	41	891				22,030		1,159	1,373	8,087	24,329	70,677	59,206	10,771	14,201	310,911	
636402																	1,754	3,466					5,220	
646301																		4,628	13,888				18,516	
646330					4,716								5,212					1,493	2,894	314		3,021	14,629	
646401			155,972		1,319	17,532											1,963	37,222	105,045	22,834	1,052	3,194	221	346,133
646402	80,969					748											730	143,511	66,821				292,779	
656300			161,699		15,174																		176,873	
656330			323,518	72,735	395,662	3,983	24,246	83,479	7,632		79,006	36,129	1,757		4,814	265		19,745	15,446	4,661	4,078	1,300	1,077,156	
656401			138,011	121,147	253,387	60,480	11,422	183,119	246,200		194,408	165,644	100,956	171	53,119	105,341	29,566	32,289	9,985	4,035	1,127	2,739	1,710,407	
656402	306,302	90,187	288,869	918	3,098	2,832			132,363								193,079	106,053	44,000				1,167,701	
666230		55,490			77																		55,567	
666300		162,795	60,816	84,874	9,167	95		4,534											25,519				347,800	
666330		353,016	505,050	367,446	141,513	8,990	1,192		389	70,615	2,963	13,020	1,275	27,185	4,305	31,758		730					1,529,447	
666401		179,212	486,947	205,400	381,510	79,580	325,045	116,254	5,341	408,848	50,744	21,895	115,257	162,263	10,632	746	396		3,001	1,816		930	2,554,887	
666402	12,036	515,778	534,938	183,581		17,585			32,992								535	1,221						1,298,666
666431		146,029																1,124						147,153
676300		13,238		126,231															546					140,015
676330		51,304	81,798	6,762	18,734																			158,598
676400		667,130	33,856	274	92,026	1,315	247		32					3,212				9,775						807,867
676430		3,811	12,309		373	3,513			1,171															21,177
676501					36																			36
686330			1,860																					1,860
Totals	517,787	2,091,961	2,931,672	1,186,596	1,379,014	228,921	368,032	387,427	427,011	479,463	327,121	236,688	246,487	192,831	74,029	335,790	327,858	322,676	224,231	92,988	29,684	23,553	12,431,820	

^a No commercial fishery occurred in 1991.^b Does not include approximately 2,490 lbs not reported on fish tickets.

Appendix Table E2.

Percent recruit and postrecruit size male red
king crab from commercial catch samples by
by year, Norton Sound Section, Bering Sea.

Year	Recruits ^a	Postrecruits ^b
	%	%
1977	53	47
1978	29	71
1979	33	67
1980	15	85
1981	10	90
1982	27	73
1983	55	45
1984	59	41
1985	45	55
1986	49	51
1987	22	78
1988	25	75
1989	23	77
1990	21	79
1991 ^c	-	-
1992	28	72
1993	31	69
1994	20	80
1995	36	64
1996	30	70
1997	49	51
1998	32	68
1999	42	58

^a Recruits = All new shell, legal size, male king crab of
carapace length <116mm.

^b Postrecruits = All other, legal size, male king crab.

^c No Summer Commercial Fishery in 1991.

Appendix Table E3. Historic summer commercial red king crab fishery economic performance, Norton Sound Section, Eastern Bering Sea, 1977 - 1999.

Year	Guideline Harvest Level (lbs) ^b	Legal Male Pop. Est. (lbs) ^b	Commercial Harvest (lbs) ^{a,b}	Number of			Number of Pots		Exvessel Price/lb	Fishery Value (millions \$)	Season Length	
				Vessels	Permits	Landings	Registered	Pulls			Days	Dates
1977	^d	10.0	0.52	7	7	13	^d	5,457	0.75	0.229	60	^d
1978	3.00	11.0	2.09	8	8	54	^d	10,817	0.95	1.897	60	6/7-8/15
1979	3.00	5.4	2.93	34	34	76	^d	34,773	0.75	1.878	16	7/15-7/31
1980	1.00	6.6	1.19	9	9	50	^d	11,199	0.75	0.890	16	7/15-7/31
1981	2.50	4.7	1.38	36	36	108	^d	33,745	0.85	1.172	38	7/15-8/22
1982	0.50	1.3	0.23	11	11	33	^d	11,230	2.00	0.405	23	8/9-9/1
1983	0.30	2.1	0.37	23	23	26	3,583	11,195	1.50	0.537	3.8	8/1-8/5
1984	0.40	2.7	0.39	8	8	21	1,245	9,706	1.02	0.395	13.6	8/1-8/15
1985	0.45	2.4	0.43	6	6	72	1,116	13,209	1.00	0.427	21.7	8/1-8/23
1986	0.42	2.8	0.48	3	3	^d	578	4,284	1.25	0.600	13	8/1-8/25 ^e
1987	0.40	2.2	0.33	9	9	^d	1,430	10,258	1.50	0.491	11	8/1-8/12
1988	0.20	3.2	0.24	2	2	^d	360	2,350	^d	^d	9.9	8/1-8/11
1989	0.20	3.2	0.25	10	10	^d	2,555	5,149	3.00	0.739	3	8/1-8/4
1990	0.20	3.2	0.19	4	4	^d	1,388	3,172	^d	^d	4	8/1-8/5
1991 ^c	0.34	3.4										
1992	0.34	3.4	0.07	27	27	^d	2,635	5,746	1.75	0.130	2	8/1-8/3
1993	0.34	3.4	0.33	14	20	208	560	7,063	1.28	0.430	52	7/1-8/28 ^f
1994	0.34	3.4	0.32	34	52	407	1,360	11,729	2.02	0.646	31	7/1-7/31
1995	0.34	3.4	0.32	48	81	665	1,900	18,782	2.87	0.926	67	7/1-9/5
1996	0.34	3.4	0.22	41	50	264	1,640	10,453	2.29	0.519	57	7/1-9/3 ^g
1997	0.08	1.6	0.09	13	15	100	520	2,982	1.98	0.184	44	7/1-8/13 ^h
1998	0.08	1.6	0.03	8	11	50	360	1,639	1.47	0.041	65	7/1-9/3 ⁱ
1999	0.08	1.6	0.02	10	9	53	360	1,630	3.08	0.073	66	7/1-9/4 ^j

^a Deadloss included in total.

^b Millions of pounds.

^c No summer commercial fishery.

^d Information not available.

^e Fishing actually began 8/12.

^f Fishing actually began 7/8.

^g Fishing began 7/9 due to fishermen's strike.

^h First delivery was made 7/10.

ⁱ First delivery was made 7/16.

^j The season was extended 24 hours due to bad weather.

Appendix Table E4. Winter commercial and subsistence red king crab harvests, Norton Sound, Eastern Bering Sea, 1978 - 1999.

Commercial			Subsistence						
Year ^a	Fishers	# Crab Harvested	Winter ^b	Permits Issued	Permits Returned	Permits Fished	Total Crab Caught ^c	Total Crab Harvested ^d	Average Harvest/fm
1978	37	9,625	1977-78	290	206	149	^e	12,506	84
1979	1	221	1978-79	48	43	38	^e	224	6
1980	1	22	1979-80	22	14	9	^e	213	24
1981	0	0	1980-81	51	39	23	^e	360	16
1982	1	17	1981-82	101	76	54	^e	1,288	24
1983	5	549	1982-83	172	106	85	^e	10,432	123
1984	8	856	1983-84	222	183	143	15,923	11,220	78
1985	9	1,168	1984-85	203	166	132	10,757	8,377	63
1986	5	2,168	1985-86	136	133	107	10,751	7,052	66
1987	7	1,040	1986-87	138	134	98	7,406	5,772	59
1988	10	425	1987-88	71	58	40	3,573	2,724	68
1989	5	403	1988-89	139	115	94	7,945	6,126	65
1990	13	3,626	1989-90	136	118	107	16,635	12,152	114
1991	11	3,800	1990-91	119	104	79	9,295	7,366	93
1992	13	7,478	1991-92	158	105	105	15,051	11,736	112
1993	8	1,788	1992-93	88	79	37	1,193	1,097	30
1994	25	5,753	1993-94	118	95	71	4,894	4,113	58
1995	42	7,538	1994-95	167	71	57	5,918	4,059	71
1996	9	1,778	1995-96	84	44	35	2,936	1,679	48
1997	2	83	1996-97	38	22	13	1,617	745	57
1998	5	984	1997-98	94	73	64	20,327	8,622	135
1999	5	2,714	1998-99	95	80	71	10,651	7,533	106
Avg 1978-1998	10	2,349	Avg 1984-1998	127	100	79	8,948	6,189	74

^a Prior to 1985 the winter commercial fishery occurred from January 1 - April 30; As of March 1985, the winter commercial harvest may occur from November 15 - May 15.

^b The winter subsistence fishery occurs during months of two calendar years (as early as December, through May).

^c The Number of crab actually caught; some may have been returned.

^d The number of crab harvested is the number of crab caught and kept.

^e Data unavailable.

Appendix Table E5. Results of population assessment surveys conducted for red king crab in Norton Sound since 1976.

Year	Date	Research Agency	Gear	Population Abundance Estimates (Number of crab)		
				Pre-2 Males ^b	Pre-1 Males ^b	Legal Males ^a
1976	9/2 - 9/5, 9/16 - 10/7	NMFS	Trawl	331,555	808,091	1,742,755
1979 ^c	7/26 - 8/5	NMFS	Trawl			809,799
1980 ^d	7/4 - 7/14	ADF&G	Pots			1,900,000
1981	6/28 - 7/14	ADF&G	Pots			1,285,195
1982	7/6 - 7/20	ADF&G	Pots			353,273
1982	9/5 - 9/11	NMFS	Trawl	356,724	832,581	877,722
1985	7/1 - 7/14	ADF&G	Pots			907,579
1985	9/16 - 10/1	NMFS	Trawl	466,858	707,140	1,051,857
1988	8/16 - 8/30	NMFS	Trawl	565,255	493,030	978,748
1991	8/22 - 8/30	NMFS	Trawl	294,801	303,682	1,287,486
1996	9/7 - 9/18	ADF&G	Trawl	452,580	325,699	536,235
1999	7/28 - 8/7	ADF&G	Trawl	103,832	940,198	1,594,341

^a Legal male red king crab were defined as at least 105 mm in carapace length for the 1996 ADF&G trawl survey and all NMFS trawl surveys except the 1979 survey which defined legal males as at least 100 mm in carapace length. ADF&G pot surveys defined legal males as at least 121 mm in carapace width.

^b Pre-2 males were defined as 76-89 mm in carapace length and pre-1 males were defined as 90-104 mm in carapace length.

^c Population estimates are valid for the date of the survey (i.e., either before or after the summer commercial fishery).

^d The 1980 pot survey estimate has been revised from the original estimate of 13.4 million pounds which was thought inaccurate due to an under-reporting of recovered tagged crab.

^e Pre-2 male and pre-1 male data is unavailable for the 1979 NMFS trawl survey.

Appendix Table E6. Size composition by percent of red king crab from winter research pots near Nome, Norton Sound, Bering Sea, 1983-1999^a

Year	SUBLEGAL			LEGAL		
	Prerecruit Twos	Prerecruit Ones	Totals	Recruits	Post-Recruits	Totals
1983	26	38	64	26	10	36
1984	35	31	66	19	16	35
1985	25	45	70	20	10	30
1986	26	35	61	22	17	39
1987	13	31	44	11	45	56
1988 ^b	-	-	-	-	-	-
1989	27	15	42	27	31	58
1990	16	33	49	25	26	51
1991	5	30	35	34	31	65
1992 ^c	-	-	-	-	-	-
1993	3	9	12	17	71	88
1994 ^c	-	-	-	-	-	-
1995	10	11	23 ^d	32	45	77
1996	22	33	64 ^d	10	26	36
1997	32	21	64 ^d	14	22	36
1998	36	44	82 ^d	9	9	18
1999	7	42	49 ^d	39	11	50

^a Sublegals = male crab less than 4 3/4" carapace width.

Pre-recruit Ones = Sublegals greater than 89mm in carapace length.

Pre-recruit Twos = Sublegals smaller than 90mm in carapace length.

Legals = male king crab greater than 4 3/4" carapace width.

Recruits = Legal new shell crab smaller than 116mm in carapace length.

Post-recruits = all non-recruit legal males.

^b No data collected in 1988 due to poor ice conditions.

^c No winter crab research study in 1992 or 1994.

^d Includes prerecruit threes.

SECTION 4: MISCELLANEOUS SPECIES

(Includes Norton Sound,
Port Clarence and Kotzebue Districts)

SECTION 4 - MISCELLANEOUS SPECIES

INTRODUCTION

Several species other than salmon, crab and herring are utilized for commercial and subsistence purposes in the Norton Sound, Port Clarence and Kotzebue Districts. Primary species include inconnu or "sheefish" (*Stenodus leucichthys*), whitefish (*Coregonus laurettae*, *Coregonus pidschian*, *Coregonus sardinella*, *Coregonus nasus*, and *Prosopium cylindraceum*), (*Coregonus sp.*, *Prosopium sp.*), Dolly Varden (*Salvelinus malma*), and saffron cod (*Eleginus gracilis*).

The fish are taken by set gillnets, beach seines, "jigging" through the ice, and rod and reel. Subsistence catches taken during the summer months are normally air dried, while winter catches are stored frozen. Fish are utilized both for human consumption and for dog feed. Fish taken for commercial purposes are mainly sold locally, although some are shipped from the area.

Subsistence harvest of most species is not limited by regulation. Commercial harvest may be prohibited in some freshwater areas, but limited commercial endeavors are allowed in many areas under terms of a permit.

INCONNU (Sheefish)

Introduction

The distribution of inconnu includes the Kobuk-Selawik River drainages, and Hotham Inlet of Kotzebue Sound and some Norton Sound drainages, but the largest populations and harvests occur within the former area (Figure 21). In the Kotzebue Sound area, adult fish migrate to upriver spawning areas after ice breakup and to wintering areas within the Hotham Inlet/Selawik Lake area during October-November. Although inconnu are capable of consecutive spawning, most fish spawn every two to three years. Inconnu mature slowly with males reaching maturity at 5-7 years of age and females at 7-11 years.

The inconnu's spawning and overwintering migration behavior makes them available for harvest by the various fisheries throughout their life cycle, and increases their vulnerability to overharvest. In addition, the inconnu's slow maturation rate increases the time required to restore depleted populations.

During the 1960's, age, sex and length data indicated stocks were being overharvested by the commercial and subsistence fisheries in the Kotzebue district. Consequently, an annual

area commercial harvest quota of 25,000 pounds of inconnu was instituted, although subsistence catches remained unrestricted.

Commercial Fishery

Most of the commercial fishing effort occurs near Kotzebue in Hotham Inlet. Fishermen use gillnets ranging from 5 1/2 inch - 7 inch stretched mesh which are set under the ice. Recorded commercial catches have remained relatively small; however, undocumented catches are believed to be significant and therefore, harvest totals should be considered minimum estimates. Restricted markets outside northwestern Alaska greatly limit commercial activity and most individuals who normally participate in the winter commercial fishery also fish for subsistence purposes. During some years, incidentally caught inconnu are also sold by commercial salmon fishermen when there is a market, but only in small amounts. There were no commercially sold sheefish reported in 1999 (Appendix Table F1).

Subsistence Fishery

Inconnu have long been utilized for subsistence purposes throughout the Kotzebue basin. Fishermen along the upper Kobuk River fish for inconnu during June through October, while the lower Kobuk and residents fish throughout much of the year. Kotzebue and Selawik fishermen fish in the Hotham Inlet and Selawik Lake during the winter months.

Appendix Table F2 estimates catches reported during the fall chum salmon subsistence surveys conducted by Subsistence Division, and for lower Kobuk River residents may include winter as well as summer and fall catches. In 1999 an estimated 8,256 sheefish were harvested by the Kobuk River communities. The mean harvests per household ranged from 1.1 sheefish in Noatak to 45.0 sheefish in Shungnak (Georgette and Utermohle, 2000). Subsistence sheefish harvest information was not collected for Kotzebue where a sizable ice fishery occurs for sheefish in late winter and spring. There is also no information concerning sheefish harvests in the Selawik area.

Escapement

In recent years aerial surveys have been conducted on key inconnu spawning areas incidental to the effort of enumerating salmon. These surveys have primarily been conducted along the upper Kobuk River in September. Survey conditions historically result in either very few or no inconnu being observed (Appendix Table F3). During these surveys, species identification has been a problem in some years. Surveys were not conducted in 1985 through 1990 due to high, turbid water, poor weather conditions, or lack of personnel. Incomplete escapement and catch data provide little basis for assessing the current population status of inconnu in the Kotzebue district, however there was some local concern that the inconnu stocks are declining.

Because of these concerns, a cooperative tagging project on sheefish in the Kotzebue District began in 1994. This study is being conducted by Sport Fish Division, U.S. Fish & Wildlife Service (USFWS) and the National Park Service (NPS). Spawning sheefish were tagged in the Upper Kobuk River and the Selawik River. Roughly 600 sheefish were tagged in the Kobuk River by Division of Sport Fish and 150 in the Selawik River by USFWS in 1994. During the fall of 1995, roughly 617 sheefish were tagged in the Upper Selawik River and approximately 1,386 sheefish in the Upper Kobuk River. In 1996, 2,300 were tagged in the Upper Kobuk and 500 in the Selawik Rivers. The Selawik River project ended in 1996. In 1997, 1,757 sheefish were tagged in the Upper Kobuk River. There are now approximately 6,520 tagged sheefish from the Kobuk River and 1,200 tagged sheefish from the Selawik River at large. Spawning population estimates of sheefish in the Upper Kobuk were 32,300 in 1995, 43,700 in 1996 and 26,782 in 1997. In the Selawik River, the spawning population estimate was 5,200 to 5,300 for both 1995 and 1996. Neither of these estimates account for the strong possibilities that females may be alternate year spawners. The results of the study should provide an estimate of the spawning sheefish populations, information on migration patterns and determine if the two stocks mix in the over-wintering area of Kobuk and Selawik Lakes.

DOLLY VARDEN

Introduction

Dolly Varden are distributed throughout the Norton Sound, Port Clarence, and Kotzebue districts. Although taxonomists have disagreed on the distinguishing Dolly Varden characteristics and distribution of Arctic Char and Dolly Varden, most now agree that char in this area are the northern form of Dolly Varden. In order to eliminate confusion, in this report these fish will be referred to as Dolly Varden, the common name for this species complex.

Dolly Varden in this area are primarily nonconsecutive spawners and spawn throughout the late summer and fall. Fry emerge in the spring and migrate to the ocean during early summer after spending from 1 to 6 (generally 2-5) years in freshwater. Since Dolly Varden are a late-maturing fish (generally age 6-7), they are susceptible to overfishing by commercial, subsistence, and/or sport fisheries. Consequently, commercial fisheries have been maintained at low levels or prohibited to both reduce the potential of overharvest and provide for reproductive and subsistence fishery needs.

Commercial Fishery

Dolly Varden are taken as a non-target species in the directed Kotzebue commercial chum salmon fishery (Tables 10). Regulation changes in 1976, which closed the commercial salmon fishery on August 31, have reduced the harvest of Dolly Varden since Dolly Varden typically pass through the harvest area during September. Dolly Varden generally appear in commercial catches during the last three weeks of August. Reported Dolly Varden catches

are dependent upon available markets. The typical season catch when buyers are purchasing Dolly Varden is between 1,000 to 3,000 fish (Appendix Table F4). Spawning and over-wintering Dolly Varden (locally called trout) typically migrate along the northern shore of Kotzebue Sound during the third week of August. Even with a reduced number of fishermen and a concentration of their effort near town, the incidental catch of trout was average in 1999. There were 1,502 Dolly Varden sold with an average weight of 7.6 pounds. The commercial harvest has been as much as 7,700 but averages around 2,000. Historically two-thirds of the catch is taken on the north side of the district near Sheshalik.

Subsistence Fishery

Dolly Varden are an important component in the diet of subsistence users in the Norton Sound-Kotzebue Sound areas. Subsistence fishermen catch Dolly Varden with seines in the fall, hook and line through the ice in the winter, and gillnets in the spring. The fall seine fishery contributes the greatest number of fish to the annual subsistence Dolly Varden harvest. Since 1962, seine catches made by the residents of Kivalina, within the Kotzebue District, have ranged from 7,000 to 49,000 Dolly Varden annually (Appendix Table F5).

In the Kotzebue District fall seine fishing is a group effort with several households comprising a fishing group. The catch is stored and allowed to freeze in willow cribs located near the seining site. These fish are used throughout the winter by the fishing group. It should be pointed out that the historical subsistence Dolly Varden catches that are summarized in Appendix Table F5 are very minimal figures due to the timing of the surveys conducted. Most Dolly Varden harvest take place prior to or just after freeze-up. The village of Noatak usually fishes prior to freeze-up, while the Kobuk River villages of Shungnak and Noorvik fish for Dolly Varden throughout the winter. No information on Dolly Varden harvests for 1999 was collected in Noatak as part of the post-season subsistence salmon harvest survey.

Most villagers in the Norton Sound District report incidental catches of Dolly Varden in their subsistence salmon nets. However, the bulk of the catch is taken by seining in the late fall.

Sport Fishery

Residents of the Kotzebue area and nonlocal residents on wilderness boating trips on the Kobuk and Noatak Rivers are the primary participants in the Dolly Varden sport fishery in the Kotzebue area watershed. Approximately 1,500 Dolly Varden are taken in this fishery annually (Sport Fish Division surveys).

Overwintering Counts

Aerial survey counts of overwintering Dolly Varden on the Wulik River have ranged from 297,257 Dolly Varden in 1969 to 30,923 Dolly Varden in 1984 (Appendix Table F6).

Weather and water conditions have precluded flying aerial surveys during many years. When weather permits, the Division of Sport Fisheries conducts aerial surveys of the spawning grounds on the Noatak River in the summer and the overwintering areas of the Kivalina and Wulik Rivers in the fall. During the fall of 1999, a survey on the Noatak River estimated 9,059 Dolly Varden. No survey was made on the Kivalina River. The Wulik River survey estimated 70,704 Dolly Varden in 1999 (Appendix Table F6).

WHITEFISH

Introduction

Although inconnu belong to the whitefish family, this section deals with several smaller species of the genera *Coregonus* and *Prosopium*. The genus *Coregonus* contains the "broad" and "humpback" whitefish or *C. nasus* and *C. pidschian*, respectively. In addition, three whitefish species known as "ciscoes" belong to this genera; ie., the least cisco (*C. sardinella*), Arctic cisco (*C. autumnalis*) and Bering cisco (*C. laurettae*). "Round" whitefish (*Prosopium cylindraceus*) are the sole representatives of the genus *Prosopium* in this area. All species normally spawn in the fall in freshwater.

Whitefish occur throughout most bodies of freshwater in the Norton Sound/Port Clarence/Kotzebue areas and can also be found in inshore marine waters at various times of the year. Whitefish are harvested to a very limited extent by the commercial and sport fisheries within the area, but are uniformly important to the various subsistence fisheries. Recently, there has been increasing interest in commercial development of this resource, especially in the Kotzebue District.

Commercial Fishery

Limited commercial whitefish harvests have been allowed since statehood, normally under the auspices of a permit which delineated harvest levels, open areas, legal gear, etc. Commercial whitefish fisheries have generally been limited to large open water areas (e.g. Grantley Harbor in the Port Clarence District) or ocean waters. Beach seines have been stipulated as legal gear in some instances in order to reduce the number of incidental species taken. Little comparative commercial catch and effort data have been recorded, but harvest levels have historically been low. A majority of the commercial catches have been made in Golovin Bay within the Norton Sound District, in the Kuzitrin River of the Port Clarence District, and in Hotham Inlet and Selawik River in the Kotzebue District. The fish have been sold to local markets for human consumption, dog food, or more recently, crab bait.

Subsistence Fishery

Whitefish have been taken mainly by beach seine or set gillnets. Catches are usually dried and used for human consumption or dog food. In some areas fish are "gutted" and dried

early in the summer, while later in the summer the fish are filleted and dried with the eggs and viscera intact.

Subsistence catch enumeration is difficult since fishermen do not count fish individually, but by "tubs", "bags", "strings" or any other estimators of gross abundance. Additionally, many fish have been dried and consumed or stored in caches prior to the survey period. Reported subsistence harvests were generally the result of a limited and sporadic survey effort and should be regarded as minimum figures and not comparable from year to year. In 1997, subsistence harvests of whitefish were included for the first time in Division of Subsistence household salmon harvest surveys in Kotzebue Sound villages. An estimated 56,326 whitefish were harvested in 1999 for subsistence in Noatak and the Kobuk river villages (Appendix Table F7). Mean household harvests ranged from 15 whitefish in Noatak to 261 whitefish in Noorvik (Georgette and Utermohle, 1998).

Escapement

Whitefish escapements have not been monitored in the past, but there have been no indications from limited Department observations or fishermen interviews of declining populations.

SAFFRON COD

Saffron cod, or tomcod as they are called locally, are extensively utilized as a subsistence resource in the Norton Sound, Port Clarence and Kotzebue Districts. Tomcod are taken through the ice by jigging as well as with gillnets in open water and dipping through the ice in Unalakleet.

There has never been an extensive commercial fishery on tomcod in the Norton Sound, Port Clarence or Kotzebue areas. During 1980, one fisherman caught and sold 89 pounds (98 tomcod) in the Nome Subdistrict. There were no commercial landings during 1982. In 1983, one Nome area fisherman caught and sold 2,548 pounds (4,348 tomcod) and in 1989 one fisherman sold 1,800 pounds locally. These fish were used for dog food, crab bait and human consumption. No commercial deliveries were reported in during 1984-1993.

In 1994, Norton Sound Economic Development Corporation (N.S.E.D.C.) provided a market for several fish species that had not been commercially utilized in the past. The need for crab bait was the primary factor in initiating the fishery at Unalakleet, where 1,402 pounds were sold in seven deliveries in January and February of 1994. In 1995, the NSEDC market was not present which was likely a factor in the reduced harvest. The 1995 harvest totaled 52 pounds which sold for \$.50 per pound with a total value of \$26.00. No harvest was reported in 1996, 1997, 1998, and 1999.

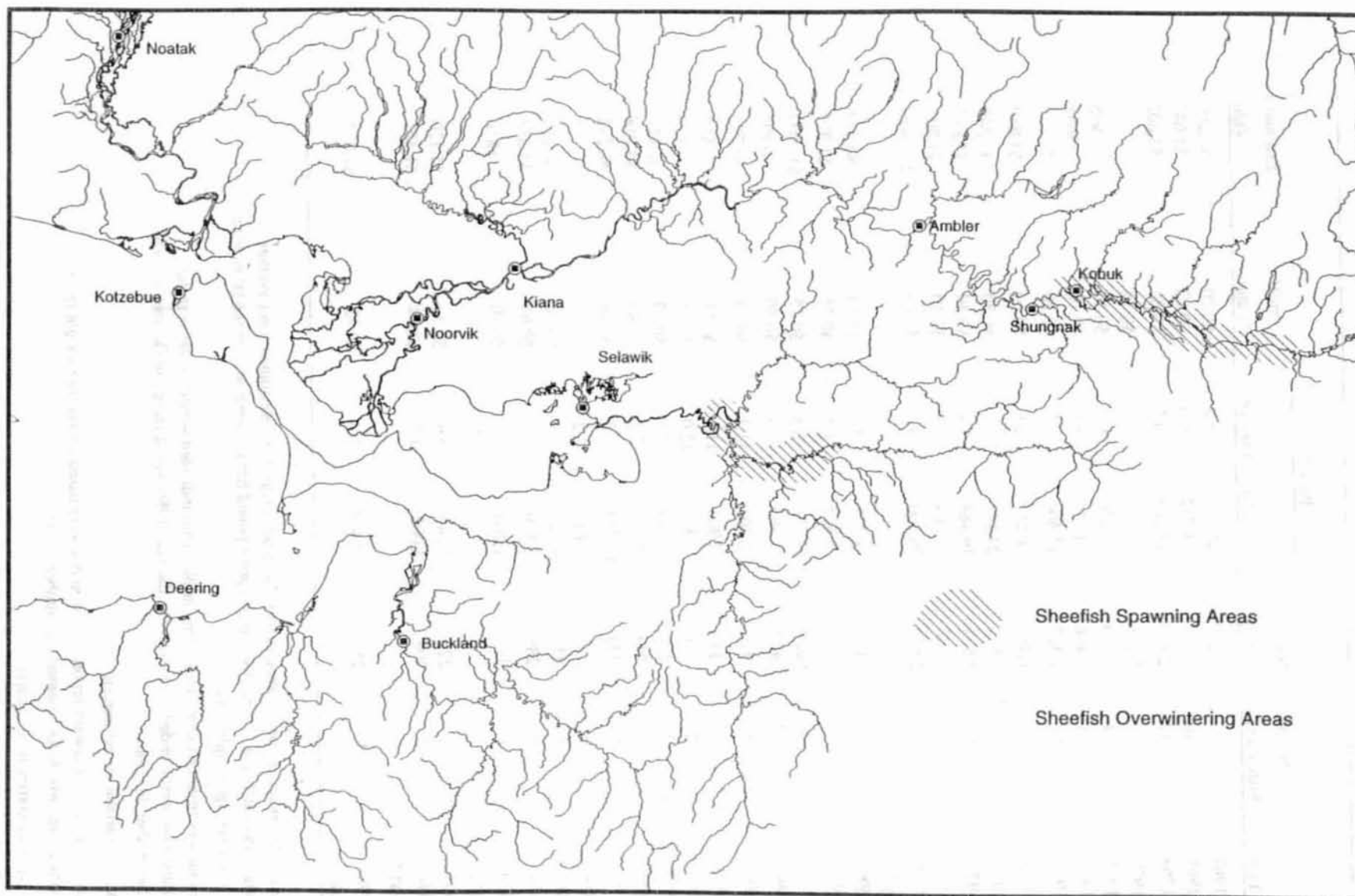
MISCELLANEOUS FINFISH SPECIES

Other finfish species taken for subsistence in the Norton Sound-Port Clarence-Kotzebue area include: rainbow smelt (boreal smelt), capelin, northern pike, starry flounder, yellow fin sole, arctic flounder, Alaska plaice, grayling, burbot, Pacific herring in the fall time, and halibut (Appendix G1).

Subsistence utilization of these species has been documented although effort and catch vary widely in scale and importance with locality. Some of these species are important to the subsistence community in certain localities during specific seasons of the year.

Rainbow smelt, like saffron cod, had a limited commercial harvest at Unalakleet. During the January, February and March of 1994, 631 pounds of rainbow smelt were reported sold in nine deliveries for bait. The smelt and cod harvests from Unalakleet both occur in estuarine areas. The smelt were reported to be higher in the water column than the cod. Either species could often be harvested from the same jigging site. Burbot, or freshwater cod, have been sold intermittently in the past in the Kotzebue, Port Clarence and Norton Sound Districts.

Figure 19. Kotzebue and Kobuk River Valley villages and their spatial relationship with inconnu spawning and overwintering areas.



Appendix Table F1. Kotzebue District winter commercial sheefish harvest statistics, 1967- 1999.^a

Year ^b	No. of Fishermen	No. of Fish	Pounds		Price/ Pound	Estimated Value
			Total	Average		
1967 ^c		4,000	26,000	6.5	\$0.20	\$5,200
1968	10	792	4,752	6.0	\$0.22	\$1,045
1969	17	2,340	15,209	6.5	\$0.25	\$3,802
1970 ^c		2,206			\$0.14	
1971	4	73	720	9.9	\$0.13	\$95
1972	5	456	4,071	8.9	\$0.16	\$651
1973	11	2,322	15,604	6.7	\$0.20	\$3,121
1974	6	1,080 ^d	6,265	5.8	\$0.30	\$1,880
1975	^c	2,543 ^d	24,161	9.5	\$0.30	\$7,248
1976	14	2,633	19,484	7.4	\$0.30	\$5,845
1977	2	566	5,004	8.8	\$0.30	\$1,501
1978	11	2,879	26,200	9.1	\$0.40	\$10,480
1979 ^c						
1980	4	1,175	8,225	7.0	\$0.50	\$4,113
1981	1	278	1,836	6.6	\$0.75	\$1,377
1982	11	2,629 ^f	17,376	6.6	\$0.75	\$13,032
1983	8	1,424	13,395	9.4	\$0.50	\$6,698
1984	5	927 ^d	10,403	11.2	\$0.55	\$5,722
1985	4	342 ^d	3,902	11.4	\$0.51	\$1,990
1986	2	26	312	12.0	\$0.75	\$234
1987	3	670	5,414	8.1	\$0.49	\$2,653
1988	3	943	7,373	7.8	\$0.45	\$3,318
1989	8	2,335	16,749	7.2	\$0.51	\$8,542
1990 ^c	6	687	5,617	8.2		
1991	5	852	8,224	9.7	\$0.50	\$4,112
1992	3	289	2,850	9.9	\$0.65	\$1,853
1993	1	210 ^d	1,700	8.1	\$0.50	\$850
1994 ^c						
1995	1	226	2,240	9.9	\$0.50	\$1,120
1996	2	308	3,002	9.7	\$0.44	\$1,321
1997 ^c						
1998	1	254	2,400	9.4	\$0.43	\$1,032
1999 ^c						

^a Data is not exact, in some instances total catch poundage was determined from average weight and catch data. Similarly, various price/pound figures were determined from price/fish and average weight data.

^b Season was from October 1 to September 30. Year indicated would be the year the commercial season ended. For example, the year 1980 would represent October 1, 1979 to September 30, 1980.

^c Data unavailable or incomplete.

^d Number of fish not always reported. Estimates were based on average weight from reported sales which documented the number of fish.

^e No reported commercial catches.

^f Estimate based on historical average weight.

Appendix Table F2. Kotzebue District reported subsistence harvests of sheefish,
1966-1999. ^a

Year	Number of Fishermen Interviewed	Reported Harvest	Average Catch per Fisherman
1966-1967	135	22,400	166
1967-1968	146	31,293	214
1968-1969	144	11,872	82
1970	168	13,928	83
1971	155	13,583	88
1972	79	3,832	49
1973	65	4,883	75
1974	58	1,062	18
1975	69	1,637	24
1976	57	966	17
1977	95	1,810	19
1978	95	1,810	19
1979	75	3,985	53
1980	74	3,117	42
1981	62	6,651	107
5/82-4/83 ^{b,c}	130	4,704	36
5/83-4/84 ^{b,c}	27	764	28
5/84-9/84 ^b	30	2,803	93
1985 ^d	2	60	30
1986 ^{b,d}	72	721	10
1987 ^d	46	276	6
1988 ^d			
1989 ^d			
1990 ^d			
1991	40	2,180	55
1992	43	2,821	66
1993	46	2,441	53
1994	171	3,181	19
1995 ^e	314	9,465	30
1996 ^e	389	6,953	18
1997 ^e	338	9,805	24.6
1998 ^e	435	5,350	13.6
1999 ^e	191	8,256	18.6

^a To obtain individual village catches during years previous to 1982, refer to the 1982 Annual Management Report. Due to limited effort during many years, total catch and effort should be regarded as minimum figures only and are not comparable year to year.

^b Catch by village for these years are presented in separate tables in respective year annual management reports.

^c Summer catches only: winter catches were not documented.

^d Villages were not surveyed for subsistence sheefish harvests from 1985 to 1990; figures shown are catches reported during the fall chum salmon subsistence surveys and may include summer as well as winter harvests.

^e Subsistence sheefish harvests are from villages on Kobuk River.

Appendix Table F3. Peak annual aerial survey counts of sheefish in the Kobuk and Selawik Rivers, 1966-1999. ^a

Year	Abundance Estimate for		Total
	Kobuk River	Selawik River	
	spawning area ^e		
1966	1,200	c	1,200
1967	1,025	c	1,025
1968	4,973	1,234	6,207
1969	3,654	c	3,654
1970	3,220	c	3,220
1971	8,166	1,196	9,362
1972	b	c	
1973	c	c	
1974	b	c	
1975	b	c	
1976	73	c	73
1977	c	c	
1978	2,824	c	2,824
1979	1,772	c	1,772
1980	250 ^d	c	250
1981	b	c	b
1982	1,009 ^d	c	1,009
1983	2,604	c	2,604
1984	c	c	
1985	c	c	
1986	c	c	
1987	c	c	
1988	c	c	
1989	c	c	
1990	c	c	
1991	17,335	c	17,335
1992	3,310	c	3,310
1993	c	c	
1994	c	c	
1995	1,840	32,273	1,840
1996	c	43,036	
1997	c	26,782	
1998	c	c	
1999	c	c	

^a Counts are considered minimal as conditions ranged from poor to good.

^b No fish reported.

^c Not surveyed.

^d Probably more sheefish than listed; species identification problems.

^e Mark recapture abundance estimates for Kobuk River spawning area conducted

Appendix Table F4. Kotzebue District incidentally caught and sold Dolly Varden during the commercial salmon fishery, 1966-1999.

Year	Number of Fish Sold	Estimated Total Catch ^g	Pounds Sold	Average Weight ^d	Average Price
1966	3,325				0.55 ^f
1967	367		2,606	7.1	0.11
1968	3,181		21,949	6.9	0.14
1969	1,089 ^a				2.84 ^f
1970	2,095				
1971	3,828 ^b		23,353	6.1	0.16
1972	7,746		56,545	7.3	0.17
1973	640		4,608	7.2	0.16
1974	2,605 ^c		20,580	7.9	0.16
1975					
1976					
1977					
1978	1,229		9,094	7.4	0.15
1979	2,523		12,523	5.0	0.25
1980	3,049		17,015	5.6	0.20
1981	3 ^e		16	5.3	0.17
1982	3,447		23,648	6.9	0.20
1983	190 ^e	845	1,108	5.8	0.20
1984	347 ^e	1,090	2,104	6.1	0.25
1985	454	3,600	3,177	7.0	0.25
1986	5 ^e	2,373	34	6.8	0.20
1987	1,261	^h	8,704	6.9	0.30
1988	752	^h	4,967	6.6	0.35
1989	3,093	^h	20,293	6.6	
1990	604	^h	4,219	7.0	0.25
1991	6,136	^h	40,747	6.6	0.18
1992	1,977	^h	11,951	6.0	0.10
1993	76	^h	540	7.1	0.10
1994	149	^h	767	5.1	0.17
1995	2,090	^h	13,195	6.3	0.20
1996	188	^h	1,153	6.1	0.25
1997	3,320	^h	23,203	7.0	0.20
1998	349	^h	2,640	7.6	0.20
1999	1,502	^h	11,352	7.6	0.20

^a Includes 269 taken by permit.

^b Includes 179 taken by permit.

^c Includes 234 taken during commercial sheefish fishery.

^d Some data extrapolated from average reported weight.

^e Limited Dolly Varden market; many fish were taken home or dumped.

^f Price per fish.

^g Estimate includes fish caught but not sold based on interviews of fishermen.

^h Estimate of Dolly Varden caught (but not sold) not made.

Appendix Table F5. Subsistence harvests of Dolly Varden from the villages of Kivalina and Noatak, 1959-1999.

Year	Kivalina		Noatak
	Number	Pounds	Number ^d
1959 ^a	34,240	85,600	
1960 ^a	49,720	124,300	
1962			27,623
1963			4,130
1968 ^e	49,512	120,214	
1969	64,970	152,750	32,350
1970	33,820	79,420	3,700
1971	29,281	68,518	5,320
1972	48,807	114,637	1,492
1973 ^b			
1979 ^c	14,600		9,060
1980			7,220
1981	15,000-18,000		3,056
1982	18,438 ^c		2,676 ^{b,f}
1983	16,270 ^c		4,545
1984	12,000 ^c		2,542
1985	10,500 ^c		
1986	7,436 ^c		46 ^h
1987 ^g			1,376 ^h
1988			
1989			
1990			
1991 ^g			4,814
1992 ^g			4,395
1993 ^g			4,275
1994			
1995 ^g			5,762
1996 ^g			5,031
1997 ^g			4,763
1998 ^g			3,872
1999 ⁱ			

^a From Saario, Doris J. and Brian Kessel. 1966. Environment of Cape Thompson Region, Alaska. U.S. Atomic Commission.

^b Storm and ice conditions prevented fall harvest.

^c Harvest data from Division of Sport Fish surveys.

^d No data available on poundage.

^e Harvest data from Stephen Braund and Associates.

^f Expanded estimates (see text on subsistence fishery in the 1982 Annual Management Report).

^g ADF&G, Div. Of Subsistence, household surveys in Noatak.

^h Subsistence fishermen just beginning to beach seine at the time of this survey.

ⁱ Data not collected

Appendix Table F6. Aerial survey counts of overwintering and spawning Dolly Varden in the Kotzebue District 1968-1999.^a

Year	Noatak River Spawner Survey ^b	Overwintering	
		Wulik River ^e	Kivalina River ^e
1968		90,236	27,640
1969		297,257	
1976		68,300	12,600
1977 ^d			
1978 ^d			
1979		55,030	15,744
1980		113,553	39,692
1981	7,922	101,826	45,355
1982	8,275	65,581	10,932
1983	2,924 ^c		
1984	9,130	30,923	5,474
1985	10,979		
1986	f	5,590	5,030
1987	f		
1988	f	80,000 ^c	
1989	f	56,384	
1990	7,261		
1991	9,605	126,985	35,275
1992	f	135,135	
1993	9,560	144,138	16,534
1994	f	66,752	
1995	6,500	128,705	28,870
1996	12,184	61,005	
1997	f	95,412	
1998	f	104,043	
1999	9,059 ^g	70,704	

^a Counts are considered minimal as data listed includes both poor and good surveys.

^b Includes spawner counts on the Kelly, Kugurorok and Nimiuktuk Rivers, tributaries of the Noatak River.

^c Incomplete survey.

^d Poor weather hampered or prevented survey.

^e Surveys conducted by Division of Sport Fish since 1979.

^f Not surveyed.

^g Poor conditions on the Nimiuktud did not allow a count.

Appendix Table F7. Subsistence whitefish catch and effort in the Kotzebue District, 1970-1999. ^a

Year	Number of Fishermen Interviewed	Number of Whitefish Harvested
1970		58,165
1971		36,012
1977		30,810
1978		77,474
1979	123	43,653
1980	67	49,106
1981	71	37,746
1982 ^b		
1983	47	16,389
1984	79	28,614
1985 ^c	46	5,229
1986 ^d	72	11,854
1987 ^d	46	20,020
1988 ^e	38	14,000
1989 ^b		
1990 ^b		
1991 ^d	63	16,015
1992 ^d	66	17,485
1993 ^d	70	19,060
1997	413 ^g	84,851
1998	435 ^g	39,754
1999	191 ^g	56,326

^a Whitefish harvest information was collected during chum salmon subsistence surveys and is to be considered a small fraction of the annual catch.

^b Data unavailable.

^c Subsistence harvest information from Kiana and Shungnak villages only.

^d Subsistence interviews from Noatak, Noorvik and Shungnak villages only.

^e Subsistence harvest information from Noorvik and Shungnak villages only.

^g Number of households contacted. Subsistence harvest information from Ambler, Kiana, Kobuk, Noatak, Noorvik, and Shungnak.

Appendix G1. List of common and scientific names of finfish species of the Norton Sound, Port Clarence, and Kotzebue Districts.

Common Name	Scientific Name
Arctic lamprey	<i>Lampetra japonica</i>
Arctic char	<i>Salvelinus alpinus</i>
Arctic cod	<i>Boreogadus saida</i>
Arctic flounder	<i>Liopsetta glacialis</i>
Arctic grayling	<i>Thymallus arcticus</i>
Alaska plaice	<i>Pleuronectes quadrituberculatus</i>
Burbot	<i>Lota lota</i>
Bering cisco	<i>Coregonus laurettae</i>
Bering poacher	<i>Ocella dodecaedria</i>
Bering wolfish	<i>Anarjicas orientalis</i>
Blackfish	<i>Dallia pectoralis</i>
Boreal smelt (rainbow-toothed)	<i>Osmerus mordax</i>
Broad whitefish	<i>Coregonus nasus</i>
Capelin	<i>Mallotus villosus</i>
Dolly Varden	<i>Salvinus malma</i>
Pond smelt	<i>Hypomesus olidus</i>
Humpback whitefish	<i>Coregonus pidschian</i>
Inconnu (sheefish)	<i>Stenodus leucichthys</i>
Lake trout	<i>Salvelinus namaycush</i>
Least cisco	<i>Coregonus sardinella</i>
Longhead dab	<i>Liranda proboscidea</i>
Ringtail snailfish	<i>Liparis rutteri</i>
Northern Pike	<i>Esox lucius</i>
Longnose sucker	<i>Casostomus catostomus</i>
Pricklebacks	<i>Stichaeidae</i>
Pacific herring	<i>Clupea harengus pallasi</i>
Rock flounder	<i>Lepidosetta bilineata</i>
Rock greenling (terpug)	<i>Hexagrammus lagocephalus</i>
Round whitefish	<i>Prosopium cylindraceum</i>
Sculpins	<i>Cottodae</i>
Pink salmon	<i>Oncorhynchus gorbuscha</i>
Chum salmon	<i>Oncorhynchus keta</i>
Coho salmon	<i>Oncorhynchus kisutch</i>
Sockeye salmon	<i>Oncorhynchus nerka</i>
Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Saffron cod	<i>Eleginus gracilis</i>
Starry flounder	<i>Platichthys stellatus</i>
Sandlance	<i>Amrodytes hexapterus</i>
Sturgeon poacher	<i>Angonus acipenserinus</i>
Threespine stickleback	<i>Gasterosteus aculeatus</i>
Ninespine stickleback	<i>Pungitius pungitius</i>
Tubenose poacher	<i>Pallasina barbata aia</i>
Whitespotted greenling	<i>Hexagrammus stelleri</i>
Yellowfin sole	<i>Limanda aspera</i>

Appendix G2. ADF&G and associated cooperative studies conducted within the Norton Sound, Port Clarence, and Kotzebue Districts, 1999.

HERRING

Herring Test Fishing

- a)Location: Norton Sound ocean waters; camps located at Cape Denbigh and Klikitarik; a third test fish crew operated out of Unalakleet.
- b)Description: To determine age class composition of the Norton Sound herring return through test fishing with variable mesh gill nets and collection of commercial catch samples.

SALMON

Unalakleet Salmon Escapement Studies

- a)Location: Unalakleet River
- b)Description: To maintain an index of salmon migration up the Unalakleet River using test gill nets. Sample commercial catch for age and size.

North River Counting Tower

- a)Location: North River, approximately 20 minutes by boat from the village of Unalakleet.
- b)Description: Cooperative project funded and operated by Kawerak Incorporated and NSEDC. Determine daily and seasonal timing and magnitude of the salmon escapements.

Kwiniuk River Salmon Counting Tower

- a)Location: Approximately five miles upstream from the mouth of the Kwiniuk River in Norton Sound.
- b)Description: Determine daily and seasonal timing and magnitude of chum and pink salmon escapements. Determine age, sex and size of chinook and chum salmon of the commercial harvest in Moses Point Subdistrict and in the Kwiniuk River escapement.

Niukluk River Salmon Counting Tower

- a)Location: About five miles upstream from the mouth of the Niukluk River in Norton Sound.
- b)Description: Determine daily and seasonal timing and magnitude of the salmon escapements.

Appendix G2. (continued)

Eldorado River Counting Tower

- a)Location: Above the furthest upstream connecting channel to the Flambeau River, approximately 45 minutes by boat from the Safety Sound highway bridge.
- b)Description: Cooperative project funded and operated by Kawerak Incorporated. Determine daily and seasonal timing and magnitude of the salmon escapements.

Nome River Salmon Counting Weir

- a)Location: Nome River, approximately 4 miles east of Nome, Norton Sound.
- b)Description: Determine daily and seasonal timing and magnitude of the spawning salmon runs. Compare aerial survey totals with tower counts in order to improve survey accuracy. As time and personnel allow, collect age and sex data through escapement sampling of subsistence catches, beach seining or carcass sampling. Assist in egg takes.

Snake River Counting Tower

- a)Location: Snake river, approximately 5 miles from Nome where turns north.
- b)Description: Cooperative project funded and operated by Kawerak Incorporated. Determine daily and seasonal timing and magnitude of the salmon escapements.

Pilgrim River Counting Tower

- a)Location: Pilgrim River, approximately ½ mile upstream from the end of the Pilgrim Hot Springs road.
- b)Description: Cooperative project funded and operated by Kawerak Incorporated. Determine daily and seasonal timing and magnitude of the salmon escapements.

Northwest Salmon Biological / Rehabilitation Projects

1). Hobson Creek Instream Incubation Project

- a)Location: A spring fed tributary to the Nome River
- b)Description: Instream incubator boxes for supplemental chum salmon production. Construction of incubator facility.

Appendix G2.(continued)

2). Boulder Creek Instream Incubation Project

a)Location: A spring fed tributary to the Snake River

b)Description: Instream incubator boxes for supplemental chum salmon production.

3). Salmon Lake Instream Incubation Project

a)Location: A spring fed tributary to the Salmon Lake

b)Description: Experimental instream incubator boxes for supplemental sockeye salmon production.

4). Salmon Lake Limnology Project

a)Location: A 1,851 acre lake at the headwaters of the Pilgrim River which drains into Port Clarence.

b)Description: To apply liquid fertilizer to restore the sockeye population to historic levels and to obtain limnological and biological data to evaluate the effectiveness of fertilizer application.

5). Glacial Lake Limnology Project

a)Location: A 986 acre lake at the headwaters of the Sinuk River which drains into the Bering Sea.

b)Description: To obtain limnological and biological data to evaluate the potential to restore the sockeye population to historic levels.

Kobuk River Test Fish Project

a)Location: Lower Kobuk River near Kiana

b)Description: 1) To evaluate the chum salmon abundance migrating into the Kobuk River drainage using systematic drift gill net catches.

2) To assess, in a qualitative way, the impact of the Kotzebue District commercial salmon fishery on chum salmon abundance into the Kobuk River drainage for fisheries management purposes.

3) Describe the migratory timing for chum salmon in the lower Kobuk River.

4) Sample for age, sex and size.

Appendix G2. (continued)

Subsistence Salmon Fishing Surveys

- a) Location: Norton Sound, Port Clarence, and Kotzebue Districts.
- b) Description: Determine subsistence utilization of salmon for formulating management procedures and goals. House-to-house surveys were conducted in the Norton Sound, Port Clarence, and Kotzebue District surrounding villages by the Division of Subsistence. Subsistence salmon permits were issued in the Nome Subdistrict.

CRAB

Nearshore Winter King Crab Study

- a) Location: Ocean waters of Norton Sound, 1 to 1.5 miles south of Nome.
- b) Description: Document the abundance and distribution of red king crab in nearshore Nome waters. Tag all male new shell red king crab with carapace length ≤ 100 mm.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-H-Z-1-99	June 14, 1999	This emergency order opens Subdistricts 1, 2, and 3 to commercial gillnet herring fishing beginning at 5:00 a.m. until 9:00 a.m. Each vessel may operate 50 fathoms of gillnet, only. There is a possibility of an extension. An announcement regarding if an extension is allowed will be made at 8:00 a.m. on VHF 7a and SSB 4125.	The first herring have arrived at Cape Denbigh and the spawning beds of southern Norton Sound. Quantities are low and roe quality is affected by the high proportion of males. There is a limited market for sac roe herring this season and the harvest is anticipated to fall far short of the harvest guideline. In an attempt to maximize the harvest, the herring fishery is opening early and will continue to open so that those fishers with a market can make the most of the limited fishery. Both buyers have expressed concern that they can not accommodate all the fishers that wish to participate in the fishery. Permit holders are cautioned to be sure they can sell their fish before fishing. If the buyer will not accept the catch it will be the responsibility of the permit holder to find a use for the herring. Do not dump your herring. The permit holder can be cited if the fish are wasted.
3-H-Z-2-99	June 14, 1999	This emergency order extends the opening in Subdistricts 1, 2, and 3 for commercial gillnet herring fishing that began at 5:00 a.m. until 1:00 p.m. Each vessel may operate 50 fathoms of gillnet, only. There is a possibility of an extension. An announcement regarding if an extension is allowed will be made at 12:00 noon on VHF 7a and SSB 4125.	Early reports from the opening this morning indicate good quality roe content and strong catch rates at Cape Denbigh. Limited catches are reported from Black Point, but roe quality there has not been reported. Sea ice is a concern to the south of the Unalakleet. This opening is extended to harvest the current movement of herring before quality declines. Another movement of fish is anticipated in the next few days. There is a limited market for sac roe herring this season and the harvest is anticipated to fall far short of the harvest guideline. In an attempt to maximize the harvest, the herring fishery was opened early and will continue to open so that those fishers with a market can make the most of the limited fishery. Both buyers have expressed concern that they can not accommodate all the fishers that wish to participate in the fishery. Permit holders are cautioned to be sure they can sell their fish before fishing. If the buyer will not accept the catch it will be the responsibility of the permit holder to find a use for the herring. Do not dump your herring. The permit holder can be cited if the fish are wasted.
3-H-Z-3-99	June 15, 1999	This emergency order opens Subdistrict 3 of Norton Sound for commercial gillnet herring fishing beginning at 7:00 a.m. until 11:00 a.m. Each vessel may operate 50 fathoms of gillnet, only. There is a possibility of an extension. An announcement regarding if an extension is allowed will be made at 10:00 a.m. on VHF 7a and SSB 4125.	Reports from sampling this evening indicate good quality roe at Cape Denbigh. The aerial survey and spotter reports indicate a large biomass is present now at Cape Denbigh. Black Point has a much more limited biomass present and the recent opening indicates a poor roe quality there. Sea ice is a concern to the south of the Unalakleet. The buyers have expressed concern that they can not accommodate all the fishers that wish to participate in the fishery. Permit holders are cautioned to be sure they can sell their fish before fishing. This also means checking the roe quality prior to loading the fishing boat. Several boats were turned away at Black Point due to poor roe quality. If the buyer will not accept the catch it will be the responsibility of the permit holder to find a use for the herring. Do not dump your herring. The permit holder can be cited if the fish are wasted.

Appendix G3 Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-H-Z-4-99	June 16, 1999	This emergency order opens Subdistricts 1, 2, and 3 of Norton Sound for commercial gillnet herring fishing beginning at 7:00 a.m. until 2:00 p.m. Wednesday, June 16. Each vessel may operate 50 fathoms of gillnet, only. There is a possibility of an extension. An announcement regarding if an extension is allowed will be made at 12:00 noon on VHF 7A and SSB 4125.	An aerial survey flown today observed herring spread throughout the Norton Sound District. Small schools of fish and spawn were found as broadly separated as Stuart Island and Topkok Head. The biomass observed yesterday near Elim was moving out of that subdistrict today into Golovin Bay and along the coast west of Rocky Point. The major biomass observed near Shaktoolik is now believed to be moving southward along the eastern coast of Norton Sound. Department test samples indicated a progression of herring movement along the beach. The leading portion near Klikitarik consisted of predominately males, near Unalakleet the sex ratio was nearly even, and the majority of the fish at Cape Denbigh were spawn outs. This fishing period is scheduled to target the major portion of the Norton Sound biomass as it approaches to the spawning grounds. Fish in the northern subdistricts have passed out of the fisherman's reach while ice in the southwest may hamper fishing efforts. The buyers have expressed concern that they can not accommodate all the fishers that wish to participate in the fishery. Permit holders are cautioned to be sure they can sell their fish before fishing. This also means checking the roe quality prior to loading the fishing boat. Several boats were turned away at Black Point due to poor roe quality. If the buyer will not accept the catch it will be the responsibility of the permit holder to find a use for the herring. Do not dump your herring. The permit holder can be cited if the fish are wasted.
3-H-Z-5-99	June 16, 1999	This emergency order opens commercial gillnet herring fishing in Subdistrict 7 of Norton Sound from 12:00 noon Wednesday, June 16 until 6:00 pm. Wednesday, June 30. Each vessel may operate 50 fathoms of gillnet, only.	An aerial survey flown on June 15 observed herring spread throughout the Norton Sound District. Small schools of fish and spawn were found as far north as the Safety Bridge. There is a movement of herring along the northern shore of Norton Sound. This movement will reach the vicinity of Nome during the next week. Herring will be abundant during that time. Two fishers have requested an opportunity to harvest herring for bait near Nome. The commercial harvest is not anticipated to reach the harvest guideline and does not present a conservation concern. This fishing period is being allowed to harvest herring while they are at their peak abundance for local fishers. Participants in the Subdistrict 7 fishery are required to register with the Department staff at either the Nome or Unalakleet office. Periodic harvest reports will be required.
3-H-Z-6-99	June 16, 1999	This emergency order extends commercial gillnet herring fishing in Subdistricts 1, 2, and 3 of Norton Sound from 2:00 p.m. Wednesday, June 16 until 7:00 pm. Wednesday June 16. Each vessel may operate 50 fathoms of gillnet, only.	An aerial survey flown on June 15 observed herring spread throughout the Norton Sound District. Small schools of fish and spawn were found as broadly separated as Stuart Island and Topkok Head. The biomass observed yesterday near Elim was moving out of that subdistrict into Golovin Bay and along the coast west of Rocky Point. The major biomass observed near Shaktoolik on June 14 is now believed to be moving southward along the eastern coast of Norton Sound. This fishing period is scheduled to target the major portion of the Norton Sound biomass as it approaches the spawning grounds. Fish in the northern subdistricts have passed out of the fisherman's reach while ice in the southern portion of the Sound may hamper fishing efforts. The commercial harvest is not anticipated to reach the harvest guideline and does not present a conservation concern. The fishing period is being extended to maximize the harvest while remaining within the available processing capacity.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-H-Z-7-99	June 17, 1999	This emergency order opens a commercial gillnet herring fishing period in Subdistricts 1, 2, and 3 of Norton Sound from 8:00 a.m. Thursday, June 17 until 2:00 pm. Thursday June 17. Each vessel may operate 50 fathoms of gillnet, only.	Aerial surveys flown on June 15 and 16 observed herring spread throughout the Norton Sound District. Small schools of fish and spawn were found as broadly separated as Stuart Island and Topkok Head. The biomass observed June 13 near Elim was moving out of that subdistrict into Golovin Bay and along the coast west of Rocky Point. The major biomass observed near Shaktoolik on June 14 is now believed to be moving southward along the eastern coast of Norton Sound. This fishing period is scheduled to target the major portion of the Norton Sound biomass as it approaches the spawning grounds. Fish in the northern subdistricts have passed further out of the fisherman's reach while ice in the southern portion of the Sound may hamper fishing efforts. The commercial harvest is not anticipated to reach the harvest guideline and does not present a conservation concern.
3-H-Z-8-99	June 17, 1999	This emergency order extends a commercial gillnet herring fishing period in Subdistricts 1, 2, and 3 of Norton Sound from 2:00 p.m. Thursday, June 17 until 8:00 pm. Thursday June 17. Each vessel may operate 50 fathoms of gillnet, only.	An aerial survey flown this morning found the sea ice backing off the beach along the southern shore of Norton Sound to the west Shorty Cove. Heavy spawn was found from Shorty Cove west for 5 miles and from Klikitarik west 4 miles. Spawn was still building. North of Shorty Cove, heavy ice was still close to the beach and survey conditions were poor. The survey noted some round and distinct schools apparently traveling south from Unalakleet to the vicinity of Tolstoi Point. Both commercial reports and test fishing samples indicate the age of the herring north of Unalakleet have shifted to smaller fish and the incidence of green fish has increased there. The staff believes the main spawning migration has begun to the <i>Fucus</i> beds of southern Norton Sound. The catches at Cape Denbigh seem to be similar to those of yesterday. Catch rates there are expected to be slow but high quality. The opening is intended to allow a commercial harvest of high quality herring now present in eastern Norton Sound.
3-H-Z-9-99	June 18, 1999	This emergency order opens a commercial gillnet herring fishing period in Subdistricts 1, 2, and 3 of Norton Sound from 7:00 a.m. until 3:00 pm. Friday, June 18. Each vessel may operate 50 fathoms of gillnet, only.	An aerial survey flown this morning found the sea ice backing off the beach along the southern shore of Norton Sound from Shorty Cove to the west. Heavy spawn was found from Shorty Cove west for 5 miles and from Klikitarik west 4 miles. Spawn has been building throughout the day. North of Shorty Cove heavy ice was still close to the beach and survey conditions were poor. The survey noted some round and distinct schools apparently traveling south from Unalakleet to the vicinity of Tolstoi Point. Both commercial reports and test fishing samples indicate the age of the herring north of Unalakleet have shifted to smaller fish and the incidence of green fish has increased there. The staff believes the main spawning migration has begun to <i>Fucus</i> beds of southern Norton Sound. The catches at Cape Denbigh seem to be similar to those of yesterday. Catch rates there are expected to be slow but high quality. The opening is intended to allow a commercial harvest of high quality herring now present in eastern Norton Sound.

Appendix G Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-H-Z-10-99	June 18, 1999	This emergency order opens a commercial herring beach seine fishing period in Subdistricts 2 and 3 of Norton Sound from 1:00 p.m until 5:00 pm. Friday, June 18. This beach fishing period is being conducted coincidental with a gillnet period already in progress in the same area.	The Norton Sound herring preseason GHL was set at 8,234 st. and the beach seine gear type allocation was set at 791 st. Approximately 1,200 st. of herring has been harvested to date by gillnet gear and none by beach seines. A beach seine fisherman has expressed an interest in fishing and has attained a market for his potential catch. This period is scheduled to provide opportunity to beach seine fishermen. The herring spawning migration is well underway and fish quality may be mixed. Commercial markets are demanding high quality roe. Fishermen are advised to test their catch prior to drying up their nets to assure fish quality.
3-H-Z-11-99	June 18, 1999	This emergency order extends a commercial gillnet herring fishing period in Subdistricts 1, 2, and 3 of Norton Sound from 3:00 p.m. Friday, June 18 until 24:00 Friday, June 18. Each vessel may operate 50 fathoms of gillnet, only.	The total Norton Sound herring spawning migration is well underway with herring spread widely throughout the fishing district. Approximately one third of the preseason estimated biomass has been observed by department surveyors and test fishing agrees closely with the expected age compositions. Persistent drifting ice in the southern portion of the district has kept herring from reaching the spawning beds and has restricted net fishing. Nearly all fishing has occurred near Cape Denbigh. The amount of herring in that area is small and the catch rate is slow, yet roe quality continues to be acceptable. It is expected that younger age classes and spawned out fish will soon become mixed with the herring in the area and reduce the overall quality of the harvest. This period is being extended to provide additional fishing opportunity while the available herring are of an acceptable quality.
3-H-Z-12-99	June 19, 1999	This emergency order opens a commercial gillnet herring fishing period in Subdistricts 1, 2, and 3 of Norton Sound from 8:00 a.m until 3:00 pm. Saturday, June 19. Each vessel may operate 50 fathoms of gillnet, only.	The total Norton Sound herring spawning migration is well underway with herring spread widely throughout the fishing district. Approximately one third of the preseason estimated biomass has been observed by department surveyors and test fishing agrees closely with the expected age compositions. Persistent drifting ice in the southern portion of the district has kept herring from reaching the spawning beds and has restricted net fishing. Nearly all fishing has occurred near Cape Denbigh. The amount of herring in that area is small and the catch rate is slow, yet roe quality continues to be acceptable. It is expected that younger age classes and spawned out fish will soon become mixed with the herring in the area and reduce the overall quality of the harvest. This period is being scheduled to provide additional fishing opportunity while the available herring are of an acceptable quality.
3-H-Z-13-99	June 19, 1999	This emergency order extends commercial gillnet herring fishing in Subdistricts 1, 2, and 3 of Norton Sound from 3:00 p.m Saturday, June 19 until 10:00 pm. Saturday, June 19. Each vessel may operate 50 fathoms of gillnet, only	An aerial survey flown on June 17 observed herring spread throughout the Norton Sound District. Small schools of fish and spawn were found as broadly separated as Stuart Island and Topkok Head. In a survey flown on June 18 from Stewart Island to Cape Denbigh, 11,600 tons of herring were observed in the affected subdistricts. This fishing period is scheduled to target the major portion of the Norton Sound biomass as it approaches the spawning grounds. Ice in the southern portion of the Sound may hamper fishing efforts. The commercial harvest is not anticipated to reach the harvest guideline and does not present a conservation concern. The fishing period is being extended to maximize the harvest while remaining within the available processing capacity.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-H-Z-14-99	June 20, 1999	This emergency order opens a commercial gillnet herring fishing period in Subdistricts 1, 2, and 3 of Norton Sound from 8:00 a.m. until 3:00 pm. Sunday, June 20. Each vessel may operate 50 fathoms of gillnet, only.	The Norton Sound herring spawning migration is well underway with herring spread widely throughout the fishing district. Approximately one third of the preseason estimated biomass has been observed by department surveyors and test fishing agrees closely with the expected age compositions. Persistent drifting ice in the southern portion of the district has kept herring from reaching the spawning beds and has restricted net fishing. Nearly all fishing has occurred near Cape Denbigh and St. Michaels Bay areas. The amount of herring in those areas is small and the catch rate is slow, yet fishers have been able to locate fish of acceptable roe quality. It is expected that younger age classes and spawned out fish will soon become mixed with the herring in the area and reduce the overall quality of the harvest. This period is being scheduled to provide additional fishing opportunity while the available herring are of an acceptable quality.
3-H-Z-15-99	June 20, 1999	This emergency order extends commercial gillnet herring fishing in Subdistrict 1 of Norton Sound from 3:00 p.m. Sunday, June 20 until 10:00 pm. Sunday, June 20. Each vessel may operate 50 fathoms of gillnet, only.	The Norton Sound herring spawning migration is well underway with herring spread widely throughout the fishing district. Approximately one third of the preseason estimated biomass has been observed by department surveyors and test fishing agrees closely with the expected age compositions. Persistent drifting ice in the southern portion of the district has kept herring from reaching the spawning beds and has restricted net fishing. Fish in the Cape Denbigh area is no longer acceptable to commercial buyers. The amount of herring in the St. Michael area is small and the catch rate is slow, yet fishers have been able to locate fish of acceptable roe quality. Aerial surveys have observed increasing amounts of spawned-out herring massing along the coast from Unalakleet to Shaktoolik which indicates we are nearing the end of the season. It is expected that younger age classes and spawned out fish will soon become mixed with the herring in the area and reduce the overall quality of the harvest. This period is being extended to provide additional fishing opportunity while the available herring are of an acceptable quality.
3-H-Z-16-99	June 21, 1999	This emergency order opens a commercial gillnet herring fishing period in Subdistrict 1 of Norton Sound from 8:00 a.m. until 3:00 p.m. Monday, June 21. Each vessel may operate 50 fathoms of gillnet, only.	The Norton Sound herring spawning migration is approaching the end with herring spread widely throughout the fishing district. Approximately one third of the preseason estimated biomass has been observed by department surveyors. However, test fishing agrees closely with the expected age compositions which indicates that the stock is stable. Persistent drifting ice in the southern portion of the district has kept herring from reaching the spawning beds and has restricted net fishing. Fish in the Cape Denbigh area are no longer acceptable to commercial buyers. The amount of herring in the St. Michael area is small and the catch rate is slow, yet fishers have been able to locate fish of acceptable roe quality. Aerial surveys have observed increasing amounts of spawned-out herring massing along the coast from Unalakleet to Shaktoolik which indicate the season is nearly over. It is expected that younger age classes and spawned out fish will soon become mixed with the herring in the area and reduce the overall quality of the harvest. The Norton Sound population is well above its harvest threshold and the exploitation rate to date is only 10% of the observed biomass. This period is being scheduled to provide additional fishing opportunity while the available herring are of an acceptable quality.

Appendix G5. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-H-Z-17-99	June 21, 1999	This emergency order opens a commercial herring beach seine fishing period in Subdistrict 1 of Norton Sound from 1:00 p.m. until 5:00 p.m. Monday, June 21. This beach fishing period is being conducted coincidental with a gillnet period already in progress in the same area.	The Norton Sound herring spawning migration is well underway with herring spread widely throughout the fishing district. Approximately one third of the preseason estimated biomass has been observed by department surveyors and test fishing agrees closely with the expected age compositions. Persistent drifting ice in the southern portion of the district has kept herring from reaching the spawning beds and has restricted net fishing. Fish in the Cape Denbigh area is no longer acceptable to commercial buyers. The amount of herring in the St. Michael area is small and the catch rate is slow, yet fishers have been able to locate fish of acceptable roe quality. Aerial surveys have observed increasing amounts of spawned-out herring massing along the coast from Unalakleet to Shaktoolik which indicates we are nearing the end of the season. It is expected that younger age classes and spawned out fish will soon become mixed with the herring in the area and reduce the overall quality of the harvest. The beach seine gear type has an allocation of 791st, yet it has not harvested any herring to date. This period is being scheduled to provide additional fishing opportunity while the available herring are of an acceptable quality.
3-H-Z-18-99	June 21, 1999	This emergency order extends commercial gillnet herring fishing in Subdistrict 1 of Norton Sound from 3:00 p.m. Monday, June 21 until 10:00 pm. Monday, June 21. Each vessel may operate 50 fathoms of gillnet, only.	The Norton Sound herring spawning migration is well underway with herring spread widely throughout the fishing district. Approximately one third of the preseason estimated biomass has been observed by department surveyors and test fishing agrees closely with the expected age compositions. Persistent drifting ice in the southern portion of the district has kept herring from reaching the spawning beds and has restricted net fishing. Fish in the Cape Denbigh area is no longer acceptable to commercial buyers. The amount of herring in the St. Michael area is small and the catch rate is slow, yet fishers have been able to locate fish of acceptable roe quality. Aerial surveys have observed increasing amounts of spawned-out herring massing along the coast from Unalakleet to Shaktoolik which indicate we are nearing the end of the season. It is expected that younger age classes and spawned out fish will soon become mixed with the herring in the area and reduce the overall quality of the harvest. This period is being extended to provide additional fishing opportunity while the available herring are of an acceptable quality.
3-H-Z-19-99	June 22, 1999	This emergency order opens a commercial gillnet herring fishing period in Subdistrict 1 of Norton Sound from 8:00 a.m. until 3:00 p.m. Tuesday, June 22. Each vessel may operate 50 fathoms of gillnet, only.	The Norton Sound herring spawning migration is approaching the end with herring spread widely throughout the fishing district. Approximately one third of the preseason estimated biomass has been observed by department surveyors. However, test fishing agrees closely with the expected age compositions which indicates that the stock is stable. Persistent drifting ice in the southern portion of the district has kept herring from reaching the spawning beds and has restricted net fishing. Fish in the Cape Denbigh area are no longer acceptable to commercial buyers. The amount of herring in the St. Michael area is small and the catch rate is slow, yet fishers have been able to locate fish of acceptable roe quality. Aerial surveys have observed increasing amounts of spawned-out herring massing along the coast from Unalakleet to Shaktoolik which indicate the season is nearly over. It is expected that younger age classes and spawned out fish will soon become mixed with the herring in the area and reduce the overall quality of the harvest. The Norton Sound population is well above its harvest threshold and the exploitation rate to date is only 10% of the observed biomass. This period is being scheduled to provide additional fishing opportunity while the available herring are of an acceptable quality.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3- H-Z-20-99	June 28, 1999	This emergency order opens Subdistrict 1, from Wood Point to Klikitarik Point to commercial spawn on wild kelp harvest beginning at 9:00 p.m. Monday, June 28 until 1:00 a.m. Tuesday, June 29.	Two Norton Sound herring permit holders have approached the department staff regarding their wish to commercially harvest herring spawn on wild kelp. They have limited markets for that product. A new regulation was approved to allow the commercial harvest of herring spawn on wild kelp in order to provide an opportunity for those permittees that have been unable to find other markets for the abundant herring resource of Norton Sound. Only permit holders whom have <u>not</u> participated in the gillnet or the spawn on imported kelp fishery may participate in this fishery. The regulation is patterned after the Togiak wild kelp fishery. Only permit holders may harvest kelp. Only permittees may move containers of kelp product during the opening. Crewmembers may only assist in moving product after the closure. The opening is timed to coincide with a monthly low tide and to close as the tide rises. Since there is no local market for the harvest, permittees are reminded they must conform to the reporting regulations for the sale of commercial fish. You must provide the Unalakleet office with a fish ticket for each permittee's harvest. Prospective kelpers are advised to contact the staff to check their permits and be sure they will not be in violation.
3 -S-Z-1-99	June 28, 1999	This emergency order closes the Nome Subdistrict to all Tier I subsistence salmon fishing until further notice. In addition, this emergency order establishes regular weekly Tier II marine water fishing periods which begin at 6:00 p.m. Tuesday and run until 6:00 p.m. Friday. Marine waters from Cape Nome to Topkok Head will open on Tuesday June 28. Department staff anticipates a harvestable surplus of approximately 2,000 chum salmon. The Board of Fisheries has mandated that a harvestable surplus of less than 3,430 be managed as a Tier II fishery. Beginning the week of June 28, only Tier II permit holders will be allowed to subsistence fish for salmon in the Nome Subdistrict.	For the past decade the chum salmon fisheries of the Nome Subdistrict have been weak. Although limited rebuilding has occurred the chum salmon returns are far weaker than those prior to 1987. Once again, the waters of the Nome Subdistrict are being closed to provide chum salmon spawning stock. Chum salmon are beginning to arrive in local waters at this time. The chum salmon stock of the Nome Subdistrict is judged insufficiently strong to support the full subsistence need of the residents of the Nome Subdistrict. Tier II fishing rules will allow those residents determined to be the longest users and the most dependent users of the salmon to meet their harvest needs. Subsistence fishing for Tier II permit holders will begin 6:00 p.m. June 29 and will run until 6:00 p.m. July 2 in the marine waters from Topkok Head to Cape Nome. As the salmon run develops, harvestable surpluses are anticipated in several local streams. Tier II openings will be announced in those streams beginning shortly after the Fourth of July in order to provide for ideal drying conditions. Tier II permit holders will be limited to 100 chum salmon each. The permit holders will find that in no individual location will they be allowed to take all 100 salmon. They will be required to spread their harvest over two or more locations so that fishing impacts will be spread over a broader area. Department staff will begin issuing Tier II permits June 23 at the Nome Fish and Game Offices. A person from each household awarded a permit will be issued a permit form and will be given an explanation of the fishing limits and rules. Later in the season, if the harvestable surplus is estimated to be substantially greater than 2,000 chum salmon, ten more Tier II permits may be issued. Should the harvestable surplus exceed 3,430, the management of the fishery would be converted back to Tier I management rules. The staff will be flying frequent aerial surveys and boating some of the rivers to track the salmon migration's strength and progress. The weir on the Nome River, and the counting towers on the Snake, and Eldorado Rivers will also be used to track the various salmon migrations. If a stream appears to have adequate escapement, restrictions will be lifted in that area; otherwise, the restrictions will remain in place until they no longer benefit chum salmon.

Appendix G Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-2-99	July 2, 1999	This emergency order opens the Shaktoolik, and Unalakleet Subdistricts to commercial king salmon fishing for one standard 24 hour period at 6:00 p.m. Friday, July 2. The fishing period will run from 6:00 p.m. Friday, July 2 until 6:00 p.m. Saturday, July 3 with unrestricted mesh size.	Subsistence catch reports the Unalakleet test net data and the Unalakleet sport fishery all indicate that the salmon migration is more than two weeks later than average this year. King salmon have been present in nearshore waters for approximately one week and are now starting to move upriver. The Department is concerned that a large portion of the king salmon return is milling off the mouths of rivers where they would be susceptible to a heavy commercial harvest. It is also believed that this late run could move quickly into the rivers out of the reach of the commercial fishery. This opening is intended to test the abundance of salmon in the waters of eastern Norton Sound. Little king salmon escapement is thought to have occurred so far. Therefore, this period will be limited to a reduced fishing time until the king salmon escapement is believed to be adequate in these subdistricts. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-3-99	July 5, 1999	This emergency order opens the Shaktoolik, and Unalakleet Subdistricts to commercial king salmon fishing for one standard 24 hour period at 6:00 p.m. Monday, July 5. The fishing period will run from 6:00 p.m. Monday, July 5 until 6:00 p.m. Tuesday, July 6 with unrestricted mesh size.	Catches from the recent commercial period in Subdistricts 5 and 6 harvested a near average number of chinook salmon for a first opening. Both subsistence reports and the Department's test net indicate that the king salmon return is arriving late, but building at a normal rate. Since it is still early in the king run and weather patterns have been unusual, the Department will continue to be cautious. Therefore, this period will be limited to a reduced fishing time until the king salmon escapement is believed to be adequate in these subdistricts. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-4-99	July 8, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial king salmon fishing for one standard 24 hour period at 6:00 p.m. Thursday, July 8. The fishing period will run from 6:00 p.m. Thursday, July 8 until 6:00 p.m. Friday, July 9 with unrestricted mesh size.	Catches from the recent commercial period in the Unalakleet Subdistrict included 550 chinook salmon and 860 chum salmon. Catches in the Shaktoolik Subdistrict included 128 chinook salmon and 41 chum salmon. The total commercial harvest to date for chinook salmon at Unalakleet is 1,220 and 198 chinook salmon at Shaktoolik. So far, the chinook harvest is only slightly below average for this stage of the run. Both subsistence reports and the Department's test net indicate that the king return is two weeks later than average, but building at a normal rate. Since it is still early in the king salmon run and weather patterns have been unusual, the Department will continue to be cautious. Therefore, this period will be limited to a reduced fishing time until the king salmon escapement is believed to be adequate in these subdistricts.
3-S-Z-5-99	July 12, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial king salmon fishing for one standard 24 hour period at 6:00 p.m. Monday, July 12. The fishing period will run from 6:00 p.m. Monday, July 12 until 6:00 p.m. Tuesday, July 13 with unrestricted mesh size.	The king salmon returns to Norton Sound are average to below average in strength. The Unalakleet and Shaktoolik returns seem to be the strongest in the district with returns elsewhere to the district insufficient to support commercial harvests. The fishery in eastern Norton Sound is targeting king salmon with relatively few chum salmon being harvested at this time. The chum salmon returns are also below average in strength. The escapement projects of northern Norton Sound all indicate late and under strength returns of chum salmon. The chum returns will not support commercial harvest at this time either. Chum salmon returns typically peak about July 10 throughout Norton Sound. However, the late timing of the season may allow for a late peak of the chum salmon this year. Department staff will be closely watching the escapement indices and catch rates of the various fisheries to accurately judge the condition of the chum salmon migration during the next week.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-6-99	July 15, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial chum salmon fishing for one 24 hour period, July 15. The fishing period will run from 6:00 p.m. Thursday, July 15 until 6:00 p.m. Friday, July 16 with gillnet gear restricted to a maximum mesh size of six inches	The 1999 Norton Sound commercial chinook salmon season has closed with a total harvest approximately one-third of the historical average in the Unalakleet and Shaktoolik Subdistricts. There have been no directed commercial chum salmon fishing periods so far, yet some fishermen have targeted chum salmon due to unrestricted mesh size specifications and relatively few chum have been harvested as by-catch during the chinook fishery. The total commercial chum salmon harvest is well below average for Norton Sound at this stage of the run. The chinook and chum salmon returns to fishing districts elsewhere in western Alaska have been poor. Norton Sound salmon escapement monitoring projects show that salmon returns are coming in one to two weeks later than usual. The chinook escapement is low, but it is still too early to clearly assess the chum salmon strength. Early indications of chum escapement suggest a weak return. The Department is required in regulation to restrict mesh size to a maximum of six inches by July 15 th , which is also referred to as chum gear. This fishing period is scheduled to test the chum salmon run. Since expectations are for a below average chum return, salmon management will be cautious. Fishing time will be only half as much as the typical standard 48 hour period. If results are as poor as expected, it would be likely that several periods may be skipped to enhance chum salmon escapements. No chum salmon directed fishing periods are foreseen in any other subdistrict of Norton Sound at this time.
3-S-Z-7-99	July 20, 1999	This emergency order rescinds Emergency Order 3-S-Z-1-99 and closes the Nome Subdistrict to all Tier I and Tier II subsistence salmon fishing until August 2. The Nome Subdistrict includes all marine waters and rivers from Cape Rodney to Topkok Head.	Aerial surveys flown July 15 found very low chum salmon escapements in all six of the Nome Subdistrict streams surveyed. Roughly half of the chum salmon migration is now in the rivers. The escapements were found to be from 5 to 25 percent of the annual goals with an average of 11 percent. In other words, we will be lucky to attain one-quarter of the chum salmon in the rivers needed to maintain the returns that support normal fishing activities in Nome. The escapement this year compares to the poor escapement of 1989. This is one of the worst years on record in the Nome Subdistrict. Because an adequate return was expected in the Safety Sound watershed to provide for chum salmon reproduction, department staff announced a limited Tier II fishery in marine waters east of Cape Nome earlier this year. The Tier II fishers that have participated in the fishery this season report small harvests. Tier I fishers who fished east of the Nome Subdistrict have also reported very limited success. Chum salmon returns throughout Norton Sound appear to be the worst in five years or about half the historic average. With the chum salmon returns far below expectations, the department's responsibility is now to provide an adequate escapement for reproductive needs. This requires the closure of all salmon harvests in the Nome Subdistrict. These closures will be lifted once the silver salmon begin to run in sufficient numbers to support the bulk of the subsistence harvest. This usually occurs about August 1.

Appendix G5. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-8-99	July 29, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for a 24-hour test period at 6:00 p.m. Thursday, July 29. The fishing period will run from 6:00 p.m. Thursday until 6:00 p.m. Friday.	Both the Unalakleet subsistence and sport fisheries indicate the silver salmon migration is now slowly moving into rivers, but the run strength has been difficult to assess. Recent heavy rains and high water levels have limited the effectiveness of the salmon monitoring projects at Unalakleet just as the first silver salmon are arriving. Most western Alaska chum salmon returns have been poor. The chum salmon migration is winding down with current escapements only about one third of the long-term average throughout Norton Sound. Reports from other fishing districts to the south of Norton Sound indicate that the silver salmon return will also be late and possibly weak. This conservative opening is intended to test the abundance of both silver and chum salmon in eastern Norton Sound. Additional fishing periods will be scheduled when the catch is dominated by silver salmon and a sufficient harvestable surplus is available. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-S-Z-9-99	August 2, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for a 24-hour test period at 6:00 p.m. August 2. The fishing period will run from 6:00 p.m. Monday until 6:00 p.m. Tuesday	Both the Unalakleet subsistence and sport fisheries indicate the silver salmon migration is now slowly moving into rivers, but the run strength has been difficult to assess. Recent heavy rains and high water levels have limited the effectiveness of the salmon monitoring projects at Unalakleet just as the first silver salmon are arriving. Most western Alaska chum salmon returns have been poor. The chum salmon migration is winding down with current escapements only about one third of the long-term average throughout Norton Sound. Reports from other fishing districts to the south of Norton Sound indicate that the silver salmon return will also be late or weak. The last commercial period was stormed out. This conservative fishing period is intended to, once again, test the abundance of both silver and chum salmon in eastern Norton Sound. Additional fishing periods will be scheduled when the commercial catch is predominantly silver salmon and a sufficient harvestable surplus is available.
3-S-Z-10-99	August 5, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for a 24-hour test period at 6:00 p.m. Thursday, August 5. The fishing period will run from 6:00 p.m. Thursday until 6:00 p.m. Friday.	The silver salmon returns throughout western Alaska are coming in late and appear to be weak. The recent commercial fishing periods in eastern Norton Sound have been well below average and are now mostly comprised of silver salmon. Therefore, salmon management is shifting focus away from the poor chum return where little can be gained by continuing to protect chum salmon this late in the season. Fishing effort is expected to be small due to the low catch rates. This conservative fishing period will be used to help monitor the silver salmon return by testing the abundance in eastern Norton Sound. Additional fishing time will be allowed only when a sufficient harvestable surplus is judged to be available.
3-S-Z-11-99	August 9, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for a 24-hour test period at 6:00 p.m. August 9. The fishing period will run from 6:00 p.m. Monday until 6:00 p.m. Tuesday.	The silver salmon returns throughout western Alaska are coming in late and appear to be weak. The commercial harvest in eastern Norton Sound has picked up slightly, but is still well below average. Fishing effort is expected to be small due to the low catch rates. This conservative fishing period will be used to help monitor the silver salmon return by testing the abundance in eastern Norton Sound. Additional fishing time will be allowed only when a sufficient harvestable surplus is judged to be available.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-12-99	August 12, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for a 24-hour test period at 6:00 p.m. Thursday, August 12. The fishing period will run from 6:00 p.m. Thursday until 6:00 p.m. Friday.	The silver salmon returns throughout western Alaska are coming in late and appear to be weak. The commercial harvest in eastern Norton Sound has picked up slightly, yet the total harvest is only 10% of the historical average for this point in the season. Both the Unalakleet test net and the North River tower also indicate that the silver salmon escapement is well below average. Fishing effort is expected to continue to be small due to the low catch rates. Therefore, this conservative fishing period will be used to help monitor the silver salmon return by testing the abundance in eastern Norton Sound. Additional fishing time will be allowed only when a sufficient harvestable surplus is judged to be available.
3-S-Z-13-99	August 16, 1999	This emergency order closes the Nome Subdistrict to all Tier I and Tier II subsistence salmon fishing until further notice. The Nome Subdistrict includes all marine waters and rivers from Cape Rodney to Topkok Head.	Coho salmon returns (silver salmon) are tracking below the any other coho salmon return in the last 20 years. The return is late, as was the last three generations of this age class. Virtually, all coho salmon in this area are four year-old fish. This does not allow for much buffering of the weak age classes. Strong returns tend to carry from generation to generation and poor returns are repeated at four year intervals as well. In addition to that problem, there has been low survival of coho salmon throughout western Alaska this year. Any gains in the return strength must be accomplished within the year class of the poor return. Staff will be monitoring the coho salmon returns of Norton Sound by aerial survey and escapement project. If returns do not show significant improvement in the next week, additional subsistence closures may be put in place. There is still a possibility of an adequate coho escapement yet and if that were to occur, limited subsistence fishing could be allowed.
3-S-Z-14-99	August 16, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for a 24-hour test period at 6:00 p.m. August 16. The fishing period will run from 6:00 p.m. Monday until 6:00 p.m. Tuesday.	The silver salmon returns throughout western Alaska continue to be weak. Commercial catches in eastern Norton Sound have picked up slightly, yet the total harvest is only about 10% of the historical average for this point in the season. Both the Unalakleet test net and the North River tower indicate that the silver salmon escapement is well below average. Fishing effort is expected to continue to be small due to the low catch rates. Therefore, this conservative fishing period will be used to help monitor the silver salmon return by testing the abundance in eastern Norton Sound. Additional fishing time will be allowed only when a sufficient harvestable surplus is judged to be available.
3-S-Z-15-99	August 19, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for a 24-hour fishing period at 6:00 p.m. August 19. The fishing period will run from 6:00 p.m. Thursday until 6:00 p.m. Friday.	The silver salmon return to Norton Sound is well behind schedule. However, the run strength appears to be gradually building as indicated by the various commercial fisheries and escapement monitoring projects. The commercial fishing catch per unit of effort is in the near normal range while the overall fishing effort is low. This has resulted in a low harvest of silver salmon that is approximately only 20% of the average for this time period. Therefore, this conservative fishing period will be used to help monitor the silver salmon return by testing the abundance in eastern Norton Sound. Additional fishing time will be allowed only when a sufficient harvestable surplus is judged to be available. If indicators show the run has peaked or is winding down, commercial fishing will be further restricted.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-16-99	August 26, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for a 24-hour fishing period at 6:00 p.m. August 26. The fishing period will run from 6:00 p.m. Thursday until 6:00 p.m. Friday.	The silver salmon return to Norton Sound is behind schedule and well below average. The northern subdistricts have the weakest returns with escapement levels relatively better in the eastern subdistricts. Restrictive commercial and sport fishing management actions appear to be allowing adequate numbers of silver salmon into the Unalakleet and Shaktoolik Rivers. It is anticipated that the current harvest and passage rates will result in silver salmon escapement levels within target ranges for both river systems. No other subdistricts in Norton Sound have been judged to have returns adequate to justify commercial fishing this season. The department will continue to monitor the silver salmon return and adjust commercial fishing time as the run develops. If indicators show the run has peaked or is winding down, commercial fishing will be further restricted.
3-S-Z-17-99	August 27, 1999	This emergency order closes the Golovin Subdistrict to all subsistence salmon fishing from 11:59 p.m. through September 15. The Golovin Subdistrict includes all marine waters and rivers from Rocky Point to Cape Darby. The Fish and Niukluk Rivers are within this subdistrict.	Coho salmon returns (silver salmon) in the Fish and Niukluk Rivers are estimated to be roughly 1/2 the strength needed to support a normal harvest and to provide an adequate spawning escapement. During March of 1999, the Alaska Board of Fisheries approved a Biological Escapement Goal range for the Niukluk River index area of 950 to 1900 coho by aerial survey, with a point goal of 1200 coho salmon. A survey flown August 24 counted 680 coho. Counts from the Fish River down stream of the Niukluk River did not indicate the escapement goal ranges could be attained this year. Reductions in the sport fishing harvest have not proven sufficient to allow an adequate escapement. The last effective management action left to be taken is the closure of the subsistence salmon fishery. The closure is intended to allow additional escapement and to break the poor return cycle that has been plaguing this age class for the past three generations.
3-S-Z-18-99	August 30, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing for a 24-hour fishing period at 6:00 p.m. August 30. The fishing period will run from 6:00 p.m. Monday until 6:00 p.m. Tuesday.	The silver salmon return to Norton Sound is well below average. The northern subdistricts have the weakest returns with escapement levels slightly better in the eastern subdistricts. Restrictive commercial and sport fishing management actions appear to be allowing adequate numbers of silver salmon into the Unalakleet and Shaktoolik Rivers. It is anticipated that the current harvest and passage rates will result in silver salmon escapement levels within target ranges for both river systems. No other subdistricts in Norton Sound have been judged to have returns adequate to justify commercial fishing at this time. The department will continue to monitor the silver salmon return and adjust commercial fishing time as the run develops. Fish quality is beginning to decrease, but is still acceptable to the commercial salmon buyer.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-Z-19-99	September 2, 1999	This emergency order opens the Shaktoolik and Unalakleet Subdistricts to commercial silver salmon fishing to a final 48-hour fishing period at 6:00 p.m. September 2. The fishing period will run from 6:00 p.m. Thursday until 6:00 p.m. Saturday.	The silver salmon return to Norton Sound is winding down with total runs well below average. The commercial fishing season normally closes by regulation on September 7 th . Escapement rates to the eastern subdistricts have been slow, but appear to be acceptable as a result of reduced commercial and sport fishing restrictions. Earlier management strategy was to finish the season with two 24 hour periods. However, commercial harvests have dropped off significantly. At the suggestion of the commercial salmon buyer and some fishermen, the department has decided to combine the final periods into a single 48 hour period. This will allow the fishermen more flexibility in operating their nets. It will allow fish to be harvested before the run completely drops off. And the salmon buyer will be able to operate more efficiently at the expected lower catch rate. It is felt that the continued low silver salmon return to Norton Sound warrants this continued conservative management.
3-K-Z-1-99	July 1, 1999	This emergency order relaxes the closure line described in regulation eastward to 161° 30' west longitude to be effective at the fishery opening on noon July 1 1999.	Residents of eastern Norton Sound have requested that commercial fishing be allowed in areas more accessible to their communities. This order will provide an incentive for commercial fishers that have been unwilling to travel far from their homeports to participate in the fishery. King crab have a seasonal migration and are expected to still be present in the area to be opened by this order. Fewer sublegal crab are expected to be present in the extended area than in the normally open waters due its distance from the nursery area in northern Norton Sound. This will help to concentrate the fishery on legal crab and reduce the handling mortality of sublegal crab. Fewer than normal commercial fishers are anticipated during the 1999 season due to low prices and the small harvest guideline. The 1998 commercial harvest of king crab fell far short of harvest guideline. At this time no processing company has expressed their intent to purchase Norton Sound king crab. Fishers are advised to be sure of their market before harvesting crab.

Appendix G3 Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-K-Z-2-99	July 3, 1999	This emergency order relaxes the nearshore closure line in the vicinity of Unalakleet eastward to 161° 15' west longitude to be effective at noon July 3, 1999.	Residents of eastern Norton Sound have requested that commercial fishing be allowed in areas more accessible to their communities. One commercial fisher has registered to fish in this eastern Norton Sound statistical area. Over the past year there has been some discussion of the impacts of relaxing the eastern Norton Sound line and changing the fishing season. Because there is only a limited market for king crab in Norton Sound this season and because the timing of fish migrations have been delayed this season, there is an opportunity to gather information about the impacts of fishing early and nearer the eastern shore. An observer will be placed onboard the fishing vessel to record size of the crab caught and their health. The limited commercial effort is not expected to have significant impact on the distribution of crab harvest between commercial and subsistence users of the resource. King crab have a seasonal migration and are expected to still be present in the area to be opened by this order for a limited time. Fewer sublegal crab are expected to be present in the extended area than in the normally open waters due its distance from the nursery area in northern Norton Sound. This will help to concentrate the fishery on legal crab and reduce the handling mortality of sublegal crab. Fewer than normal commercial fishers are anticipated during the 1999 season due to low prices and the small harvest guideline. The 1998 commercial harvest of king crab fell far short of the harvest guideline. At this time no processing company has expressed their intent to purchase Norton Sound king crab. Fishers are advised to be sure of their market before harvesting crab.
3-S-X-1-99	July 12, 1999	This emergency order opens the Kotzebue District for 12 hours. The first opening will begin at 6:00 a.m. Monday, July 12 and end at 6:00 p.m. Monday, July 12. An announcement of a possible second opening will be made at 9:00 p.m. Monday, July 12. The second opener if warranted, will begin at 6:00 a.m. Tuesday, July 13 and end at 6:00 p.m. Tuesday, July 13.	In keeping with the management plan published prior to the season, the commercial fishery will open July 12. This is a test opening to determine salmon abundance. With only one buyer registered and a limited market, openings will be shorter but more frequent. This will allow a better product as all salmon sold are iced whole and flown out. Reported subsistence salmon catches indicate the run is late and that there is a high incidental catch of sheefish. In the event the catch of sheefish is high, fishing will not reopen on Tuesday July 13. Due to weak 5 and 6-year age classes it is expected that early salmon catches will be low. Protecting the sheefish subsistence resource, which have normally migrated out of the commercial salmon district by this date may require a later opening. The most reliable index of chum salmon run strength is the commercial catch rate. Management using comparisons of catch rate trends will not be possible with the shorter, more frequent openings. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.
3-S-X-2-99	July 13, 1999	This emergency order opens the Kotzebue District Salmon Fishery for 12 hours. The opening will begin at 6:00 a.m. Tuesday, July 13 and end at 6:00 p.m. Tuesday, July 13.	Due to bad weather conditions during the first opener, participation was too low to determine the abundance of salmon and incidental catch of sheefish. A second period with hopefully better weather should give some catch information.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-X-3-99	July 15, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Thursday, July 15 and end at 6:00 p.m. Thursday, July 15. An announcement of a possible subsequent opening will be made at 8:00 p.m. Thursday, July 15.	In keeping with the management plan published prior to the season, the commercial fishery opened for two 12 hour periods on July 12 th and 13 th . There were no deliveries for the 12 th and only one fisherman participated on the 13 th . At this fishing level no relative salmon abundance estimate can be made and another test period is warranted. With only one buyer registered and a limited market, openings will be shorter but more frequent. This will allow a better product as all salmon sold are iced whole and flown out. Reported subsistence salmon catches indicate the run is late and that there is a high incidental catch of sheefish. In the event the catch of sheefish is high, fishing will not reopen on Friday July 16. Due to weak 5 and 6-year age classes it is expected that early salmon catches will be low. Protecting the sheefish subsistence resource, which have normally migrated out of the commercial salmon district by this date may require a delay in opening. The most reliable index of chum salmon run strength is the commercial catch rate. Management using comparisons of catch rate trends will not be possible with the shorter, more frequent openings. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.
3-S-X-4-99	July 16, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Friday, July 16 and end at 6:00 p.m. Friday, July 16.	In keeping with the management plan published prior to the season, the commercial fishery was scheduled for two 24 hour periods. This has been adjusted to twelve-hour periods to obtain better quality fish and coincide with airline schedules. Fishing effort to date has been very light and the reported catch of sheefish is within acceptable limits. Due to weak 5 and 6-year age classes it is expected that early salmon catches will be low. The most reliable index of chum salmon run strength is the commercial catch rate. Management using comparisons of catch rate trends will not be possible with the shorter, more frequent openings. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.
3-S-X-5-99	July 19, 1999	This emergency order opens the Kotzebue District salmon fishery for two 12 hour openings. The first opening will begin at 6:00 a.m. Monday, July 19 and end at 6:00 p.m. Monday, July 19. The second opening will begin at 6:00 a.m. Tuesday, July 20 and end at 6:00 p.m. Tuesday, July 20.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long term average are complicated by the shorter, more frequent openings and very limited participation. When the last two 12 hour fishing periods are combined for comparison purposes the catch rate per fisherman was above the long term average. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. To date there have been no salmon in the test fish catches on the Kobuk River. This is the latest showing since the project began in 1993 and will be monitored carefully. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.

Appendix G3 Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-X-6-99	July 28, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Wednesday, July 28 and end at 6:00 p.m. Wednesday, July 28. An announcement of a possible second opener will be made at 9:00 p.m. Wednesday, July 28.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. Test fish catches on the Kobuk River have improved in the last three days and should be at the long-term average for the project by tomorrow. Test fish catches in the general fishing district on Monday were excellent with most fish being three-year old.
3-S-X-7-99	July 29, 1999	This emergency order opens the Kotzebue District salmon fishery to two 12-hour openings. The first opening will begin at 6:00 a.m. Thursday, July 29 and end at 6:00 p.m. Thursday, July 29. The second opening will begin at 6:00 a.m. Friday, July 30 and end at 6:00 p.m. Friday, July 30.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. The 12-hour fishing period on July 28 produced catch rates per fisherman above the long term average. The test fish catches on the Kobuk River exceeded the average on July 27. With a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.
3-S-X-8-99	August 2, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Monday, August 2 and end at 6:00 p.m. Monday August 2.	Because of the demand for a better product the buyer has requested shorter but more frequent openings. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. Age composition, test fisheries, and subsistence reports will be factors in management decisions as periods are shortened. Test fish catches on the Kobuk River have improved and are well above the long-term average for the project.
3-S-X-9-99	August 4, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Wednesday, August 4th and end at 6:00 p.m. Wednesday, August 4th.	Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. The catch per unit of effort during the opener on August 2 nd was well above the historic average. Test fish catches on the Kobuk River have improved and are the second highest for this date in the project's history. Travel time from the fishery to the test-fishing site at Kiana is approximately five to seven days. The reduction in test fish catches due to the fishery will be monitored carefully to insure escapement from all portions of the run.
3-S-X-10-99	August 6, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Friday, August 6th and end at 6:00 p.m. Friday, August 6th.	Comparisons of catch rate trends with the long-term average are complicated by the shorter, more frequent openings and very limited participation. The catch per unit of effort during the opener on August 4th was well above the historic average. Test fish catches on the Kobuk River have improved and are the second highest for this date in the project's history. Travel time from the fishery to the test-fishing site at Kiana is approximately five to seven days. The reduction in test fish catches due to the fishery will be monitored carefully to insure escapement from all portions of the run.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-X-11-99	August 9, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Monday, August 9th and end at 6:00 p.m. Monday, August 9th.	Due to limited buying and shipping capacity the amount of fishing time has been reduced. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter openings and very limited participation. The catch per unit of effort for the last two periods has been much higher than the historic average. Test fish catches on the Kobuk River are the second highest since the project was initiated in 1993. With the limited effort, achieving escapement goals is not expected to be a problem.
3-S-X-12-99	August 11, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Wednesday, August 11 and end at 6:00 p.m. Wednesday, August 11.	Due to limited buying and shipping capacity the amount of fishing time has been reduced. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter openings and very limited participation. The catch per unit of effort for the last two periods has been much higher than the historic average. Test fish catches on the Kobuk River are the second highest since the project was initiated in 1993. With the limited effort achieving escapement goals is not expected to be a problem.
3-S-X-13-99	August 12, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Thursday, August 12th and end at 6:00 p.m. Thursday, August 12th.	Due to limited buying and shipping capacity the amount of fishing time has been reduced. The buyer has indicated they have the capacity to accommodate the anticipated catch on Thursday. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter openings and very limited participation. The catch per unit of effort for the last two periods has been much higher than the historic average. Test fish catches on the Kobuk River are the second highest since the project was initiated in 1993. With the limited effort, achieving escapement goals is not expected to be a problem.
3-S-X-14-99	August 13, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Friday, August 13th and end at 6:00 p.m. Friday, August 13th.	Due to limited buying and shipping capacity the amount of fishing time has been reduced. The buyer has indicated they have the capacity to accommodate the anticipated catch on Friday. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter openings and very limited participation. The catch per unit of effort for the last four periods has been much higher than the historic average. Test fish catches on the Kobuk River are the second highest since the project was initiated in 1993. With the limited effort achieving escapement goals is not expected to be a problem.

Appendix G Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-X-15-99	August 16, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Monday, August 16th and end at 6:00 p.m. Monday, August 16th.	Due to limited buying and shipping capacity the amount of fishing time has been reduced. The most reliable index of chum salmon run strength is the commercial catch rate. Comparisons of catch rate trends with the long-term average are complicated by the shorter openings and very limited participation. The catch per unit of effort for the last six periods has been much higher than the historic average. Test fishing on the Kobuk River concluded on August 13 th with catches the second highest since the project was initiated in 1993. Test fishing conducted on the Noatak River on August 14 th yielded good catches. With the limited effort achieving escapement goals is not expected to be a problem.
3-S-X-16-99	August 17, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Tuesday, August 17th and end at 6:00 p.m. Tuesday, August 17th.	The only registered buyer indicated they have the capacity to ship and process the anticipated catch from the August 16 th opening and will be prepared to buy salmon on August 17 th . Comparisons of catch rate trends with the long-term average are complicated by the shorter openings and very limited participation. The catch per unit of effort for the last six periods has been much higher than the historic average. Test fishing on the Kobuk River concluded on August 13 th with catches the second highest since the project was initiated in 1993. Test fishing conducted on the Noatak River on August 14 th yielded good catches. With the limited effort achieving escapement goals is not expected to be a problem.
3-S-X-17-99	August 18, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Wednesday, August 18th and end at 6:00 p.m. Wednesday, August 18th.	The only registered buyer indicated they have the capacity to ship and process the anticipated catch from the August 17 th opening and will be prepared to buy salmon on August 18 th . Comparisons of catch rate trends with the long-term average are complicated by the shorter openings and very limited participation. The catch per unit of effort for the last six periods has been much higher than the historic average. Test fishing on the Kobuk River concluded on August 13 th with catches the second highest since the project was initiated in 1993. Test fishing conducted on the Noatak River on August 14 th yielded good catches. With the limited effort achieving escapement goals is not expected to be a problem.
3-S-X-18-99	August 19, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Thursday, August 19th and end at 6:00 p.m. Thursday, August 19th.	The only registered buyer indicated they have the capacity to ship and process the anticipated catch from the August 18 th opening and will be prepared to buy salmon on August 19 th . Comparisons of catch rate trends with the long-term average are complicated by the shorter openings and very limited participation. The catch per unit of effort for the last seven periods has been much higher than the historic average. Test fishing on the Kobuk River concluded on August 13 th with catches the second highest since the project was initiated in 1993. Test fishing conducted on the Noatak River on August 14 th yielded good catches. With the limited effort achieving escapement goals is not expected to be a problem.
3-S-X-19-99	August 20, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Friday, August 20th and end at 6:00 p.m. Friday, August 20th.	The catch per unit of effort for the last eight periods has been higher than the historic average. Test fishing on the Kobuk River concluded on August 13 th with catches the second highest since the project was initiated in 1993. Test fishing conducted on the Noatak River on August 14 th yielded good catches. An aerial survey August 17 th showed good escapement into tributaries of the Kobuk River. With the limited effort achieving escapement goals is not expected to be a problem.

Appendix G3. Emergency Orders issued during 1999.

Emergency Order Number	Effective Date	Action Taken	Comments
3-S-X-20-99	August 23, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Monday, August 23 and end at 6:00 p.m. Monday, August 23.	Test fishing on the Kobuk River concluded on August 13 th with catches the second highest since the project was initiated in 1993. Test fishing conducted on the Noatak River on August 14 th and August 21 st yielded good catches. An aerial survey August 17 th showed good escapement into tributaries of the Kobuk River. With the limited effort achieving escapement goals is not expected to be a problem.
3-S-X-21-99	August 24, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Tuesday, August 24 and end at 6:00 p.m. Tuesday, August 24.	Test fishing on the Kobuk River concluded on August 13 th with catches the second highest since the project was initiated in 1993. Test fishing conducted on the Noatak River on August 14 th and August 21 st yielded good catches. An aerial survey August 17 th showed good escapement into tributaries of the Kobuk River. With the limited effort achieving escapement goals is not expected to be a problem.
3-S-X-22-99	August 25, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Wednesday, August 25th and end at 6:00 p.m. Wednesday, August 25th.	Test fishing on the Kobuk River concluded on August 13 th with catches the second highest since the project was initiated in 1993. Test fishing conducted on the Noatak River on August 14 th and August 21 st yielded good catches. An aerial survey August 17 th showed good escapement into tributaries of the Kobuk River. With the limited effort achieving escapement goals is not expected to be a problem.
3-S-X-23-98	August 26, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Thursday, August 26 and end at 6:00 p.m. Friday, August 27th.	The buyer has stated that Friday August 27 th will be the last day they will be purchasing salmon. Test fishing on the Kobuk River concluded on August 13 th with catches the second highest since the project was initiated in 1993. Test fishing conducted on the Noatak River on August 14 th and August 21 st yielded good catches. An aerial survey August 17 th showed good escapement into tributaries of the Kobuk River. With the limited effort achieving escapement goals is not expected to be a problem.
3-S-X-24-99	August 27, 1999	This emergency order opens the Kotzebue District salmon fishery for 12 hours. The opening will begin at 6:00 a.m. Friday, August 27 and end at 6:00 p.m. Friday, August 27.	The buyer has stated that Friday August 27 th will be the last day they will be purchasing salmon. Test fishing on the Kobuk River concluded on August 13 th with catches the second highest since the project was initiated in 1993. Test fishing conducted on the Noatak River on August 14 th and August 21 st yielded good catches. An aerial survey August 17 th showed good escapement into tributaries of the Kobuk River. With the limited effort achieving escapement goals is not expected to be a problem.

Appendix G4. Norton Sound, Port Clarence, Kotzebue Sound processors and associated data, 1999.

Company	Address	Type of Processing	District
Aqua Tech	P.O. Box 10119 Anchorage, AK 99510	Fresh Crab	Norton Sound
Glacier Fish Co.	1200 West Lake Ave Suite 900 Seattle, WA 98109	Frozen Salmon	Norton Sound
Icicle Seafoods	4019 21 st Ave West Seattle, WA 98199	Frozen Herring	Norton Sound
New West Fisheries	601 West Chestnut Bellingham, WA 98225	Frozen Herring	Norton Sound
Norton Sound Seafood	Box 323 Unalakleet	Frozen/Fresh Salmon Herring Roe on Kelp	Norton Sound
North Alaska Fisheries	Kotzebue	Fresh Salmon	Kotzebue
SnowPac	5053 E Marginal Way S Seattle, WA 98134	Frozen Herring	Norton Sound
Trident Seafoods	5303 Shilshole Ave NW Seattle, WA.	Frozen Herring	Norton Sound

NORTON SOUND AND SEWARD PENINSULA AREA

1999 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY

* Questions marked with an asterisk are asked of all households interviewed

Community: _____

Household Head Name: _____

Survey Date: _____

*Household Size _____

Interviewer: _____

Was household in community last year? No ____ Yes ____

If no, where were you living? _____

Household P.O. Box (if new): _____

*1. Did your household catch salmon for subsistence use or with a rod-and-reel this year?

No ____ Yes ____

*2. Does your household usually subsistence fish for salmon? No ____ Yes ____

FISHING HOUSEHOLDS ("Yes" to #1)

3. Please estimate how many salmon your household caught for subsistence use or with a rod-and-reel this year (your share of the catch if fishing with others). Include salmon you gave away, ate fresh, lost to spoilage, or obtained from helping others process fish.

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____ UNKNOWN SALMON _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

4. What type(s) of fishing gear did your household use for catching subsistence salmon this year?

SET GILL NET _____ SEINE _____
 ROD-AND-REEL _____ DRIFT GILL NET _____

4a. How many salmon did your household catch and keep with rod-and-reel this year?

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

5. Did your household give salmon to other households this year? No ____ Yes ____

6. How was subsistence chum salmon fishing for your household this year?

____ VERY GOOD ____ AVERAGE ____ POOR IF POOR, WHY? _____

7. Did your household catch salmon specifically for dog food? (Using salmon for dog food is allowed by regulations.)

No ____ (Go to #13) Only backbones/heads/guts/scraps/spoiled fish ____ (Go to #13) Yes ____ (Go to #8)

8. How many salmon did your household catch for dog food? (Do not include fish lost to spoilage and fed to dogs.)

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____ UNKNOWN SALMON _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

9. Were these salmon included in the estimates you already gave me? No ____ Yes ____

10. How many dogs does your household have? _____

(Go to #13)

NORTON SOUND AND SEWARD PENINSULA AREA
1999 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY (CON'T)

NON-FISHING HOUSEHOLDS ("No" to #1)

11. Did your household help another household fish, cut or hang salmon, or process it some other way? No _____ (Go to #13)
 Yes _____

12. Did you receive salmon in exchange for your help? No _____ Yes _____

If yes, please estimate how many salmon you received for your household. (Do not include fish from a F&G test net.)

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____ UNKNOWN SALMON _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

(Go to #13)

COMMERCIAL FISHING

*13. Did your household commercially fish for salmon this year? No _____ (Go to #17) Yes _____

If yes, where? _____

14. Were all of the salmon you caught when commercial fishing sold or were some brought home to eat or processed for subsistence? All sold _____ (Go to #17) Some used for subsistence _____

15. How many commercially caught salmon did your household use for subsistence?

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____ UNKNOWN SALMON _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

16. Were these salmon included in the estimates you already gave me? No _____ Yes _____

*17. Do you have any suggestions or concerns about subsistence fishing?

THANK YOU FOR YOUR TIME AND FOR HELPING WITH THIS PROJECT.

A summary of this subsistence fishing survey will be sent to you next spring (April).

NOATAK RIVER AREA

1999 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY

* Questions marked with an asterisk are asked of all households interviewed

Community: _____

Household Head Name: _____

Survey Date: _____

*Household Size _____

Interviewer: _____

Was household in community last year? No ____ Yes ____

If no, where were you living? _____

Household P.O. Box (if new): _____

*1. Did your household catch salmon for subsistence use or with a rod-and-reel this year?

No ____ Yes ____

*2. Does your household usually subsistence fish for salmon? No ____ Yes ____

FISHING HOUSEHOLDS ("Yes" to #1)

3. Please estimate how many salmon your household caught for subsistence use or with a rod-and-reel this year (your share of the catch if fishing with others). Include salmon you gave away, ate fresh, lost to spoilage, or obtained from helping others process fish.

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____ UNKNOWN SALMON _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

4. What type(s) of fishing gear did your household use for catching subsistence salmon this year?

SET GILL NET _____ SEINE _____
 ROD-AND-REEL _____ DRIFT GILL NET _____

4a. How many salmon did your household catch and keep with rod-and-reel this year?

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

5. Did your household give salmon to other households this year? No ____ Yes ____

6. How was subsistence chum salmon fishing for your household this year?

____ VERY GOOD ____ AVERAGE ____ POOR If POOR, WHY? _____

7. Did your household catch salmon specifically for dog food? (Using salmon for dog food is allowed by regulations.)

No ____ (Go to #13) Only backbones/heads/guts/scraps/spoiled fish ____ (Go to #13) Yes ____ (Go to #8)

8. How many salmon did your household catch for dog food? (Do not include fish lost to spoilage and fed to dogs.)

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____ UNKNOWN SALMON _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

9. Were these salmon included in the estimates you already gave me? No ____ Yes ____

10. How many dogs does your household have? _____

(Go to #13)

NOATAK RIVER AREA

1999 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY (CON'T)

NON-FISHING HOUSEHOLDS ("No" to #1)

11. Did your household help another household fish, cut or hang salmon, or process it some other way? No _____ (Go to #13)

Yes _____

12. Did you receive salmon in exchange for your help? No _____ Yes _____

If yes, please estimate how many salmon you received for your household. (Do not include fish from a F&G test net.)

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____ UNKNOWN SALMON _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

(Go to #13)

COMMERCIAL FISHING

*13. Did your household commercially fish for salmon this year? No _____ (Go to #17) Yes _____

If yes, where? _____

14. Were all of the salmon you caught when commercial fishing sold or were some brought home to eat or processed for subsistence? All sold _____ (Go to #17) Some used for subsistence _____

15. How many commercially caught salmon did your household use for subsistence?

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____ UNKNOWN SALMON _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

16. Were these salmon included in the estimates you already gave me? No _____ Yes _____

TROUT (CHAR) AND WHITEFISH FISHING

*17. Did your household catch trout or whitefish for subsistence use this year? No _____ (Go to #19) Yes _____

18. Please estimate how many trout and whitefish your household caught for subsistence use this year (your share of the catch if fishing with others). Include fish you caught and gave away, ate fresh, lost to spoilage, or fed to dogs.

TROUT _____

WHITEFISH _____

*19. Do you have any suggestions or concerns about subsistence fishing?

THANK YOU FOR YOUR TIME AND FOR HELPING WITH THIS PROJECT.

A summary of this subsistence fishing survey will be sent to you next spring (April).

KOBUK RIVER AREA

1999 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY

* Questions marked with an asterisk are asked of all households interviewed

Community: _____

Household Head Name: _____

Survey Date: _____

*Household Size _____

Interviewer: _____

Was household in community last year? No _____ Yes _____

If no, where were you living? _____

Household P.O. Box (if new): _____

*1. Did your household catch salmon for subsistence use or with a rod-and-reel this year?

No _____ Yes _____

*2. Does your household usually subsistence fish for salmon? No _____ Yes _____

FISHING HOUSEHOLDS ("Yes" to #1)

3. Please estimate how many salmon your household caught for subsistence use or with a rod-and-reel this year (your share of the catch if fishing with others). Include salmon you gave away, ate fresh, lost to spoilage, or obtained from helping others process fish.

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____ UNKNOWN SALMON _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

4. What type(s) of fishing gear did your household use for catching subsistence salmon this year?

SET GILL NET _____ SEINE _____
 ROD-AND-REEL _____ DRIFT GILL NET _____

4a. How many salmon did your household catch and keep with rod-and-reel this year?

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

5. Did your household give salmon to other households this year? No _____ Yes _____

6. How was subsistence chum salmon fishing for your household this year?

_____ VERY GOOD _____ AVERAGE _____ POOR _____ If POOR, WHY? _____

7. Did your household catch salmon specifically for dog food? (Using salmon for dog food is allowed by regulations.)

No _____ (Go to #13) Only backbones/heads/guts/scraps/spoiled fish _____ (Go to #13) Yes _____ (Go to #8)

8. How many salmon did your household catch for dog food? (Do not include fish lost to spoilage and fed to dogs.)

CHUM _____ CHINOOK _____ PINK _____ SOCKEYE _____ COHO _____ UNKNOWN SALMON _____
 ("DOGS") ("KINGS") ("HUMPIES") ("REDS") ("SILVERS")

9. Were these salmon included in the estimates you already gave me? No _____ Yes _____

10. How many dogs does your household have? _____

(Go to #13)

KOBUK RIVER AREA

1999 SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY (CON'T)

NON-FISHING HOUSEHOLDS ("No" to #1)

11. Did your household help another household fish, cut or hang salmon, or process it some other way? No _____ (Go to #13)

Yes _____

12. Did you receive salmon in exchange for your help? No _____ Yes _____

If yes, please estimate how many salmon you received for your household. (Do not include fish from a F&G test net.)

CHUM _____
("DOGS")CHINOOK _____
("KINGS")PINK _____
("HUMPIES")SOCKEYE _____
("REDS")COHO _____
("SILVERS")

UNKNOWN SALMON _____

(Go to #13)

COMMERCIAL FISHING

*13. Did your household commercially fish for salmon this year? No _____ (Go to #17) Yes _____

If yes, where? _____

14. Were all of the salmon you caught when commercial fishing sold or were some brought home to eat or processed for subsistence? All sold _____ (Go to #17) Some used for subsistence _____

15. How many commercially caught salmon did your household use for subsistence?

CHUM _____
("DOGS")CHINOOK _____
("KINGS")PINK _____
("HUMPIES")SOCKEYE _____
("REDS")COHO _____
("SILVERS")

UNKNOWN SALMON _____

16. Were these salmon included in the estimates you already gave me? No _____ Yes _____

SHEEFISH AND WHITEFISH FISHING

*17. Did your household catch sheefish or whitefish for subsistence use this year? No _____ (Go to #19) Yes _____

18. Please estimate how many sheefish and whitefish your household caught for subsistence use this year (your share of the catch if fishing with others). Include fish you caught and gave away, ate fresh, lost to spoilage, or fed to dogs.

SHEEFISH _____

WHITEFISH _____

*19. Do you have any suggestions or concerns about subsistence fishing?

THANK YOU FOR YOUR TIME AND FOR HELPING WITH THIS PROJECT.

A summary of this subsistence fishing survey will be sent to you next spring (April).

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